THE WEATHER AND CIRCULATION OF MARCH 1958[1]

RAYMOND A. GREEN

Extended Forecast Section, U. S. Weather Bureau, Washington, D. C.

1. INTRODUCTION

Many aspects of the weather in the United States during March 1958 were record-breaking on a monthly but not on a daily basis. Persistent California rains, recurrent storms across southern United States and up the east coast, and sustained rather than intense cold in the south-central Great Plains accounted for many records this month. Opposite extremes of warmth and dryness were reported across the northern United States. These anomalous weather features were associated with a blocking High of record intensity over Canada. Violent storms were few and confined to coastal sections; they included a large east coast storm, and tornadoes near Eureka and Fresno, Calif. and West Palm Beach, Fla.

2. GENERAL CIRCULATION

MARCH INDEX CYCLE

Earlier articles in this series [1, 2] have described the sharp decline of the temperate westerly index at 700 mb. in January 1958 and the great index cycle which terminated, or was at least interrupted, in late February. The zonal index again plunged rapidly in early March and remained low through most of the month, recovering to normal during the final week. Departures from normal were smaller than those observed in February, due partly to the normal seasonal decline indicated by the dashed line in figure 1.

Subtropical westerly indices shown in the lower solid curve of figure 1 reflected a similar compensation for subnormal temperate westerlies to that noted in February [2]. Low-latitude westerlies diminished almost to normal in early March but increased rapidly after the 5th and remained abnormally strong well into April. Index values, both subtropical and temperate, fluctuated little during mid-March.

Since the temperate westerly index curve was U-shaped, with low values strongly predominant (fig. 1), the mean wind speed profile of figure 2 displays a large area (stippled) between the normal profile (dashed) and the subnormal profile observed. Southward from 35° N., where the profiles cross, the westerlies were stronger than normal but about 4 m. p. s. weaker at the peak (near 32° N.) than in February.

[1] See Charts I—XVII following p. 116 for analyzed climatological data for the month.

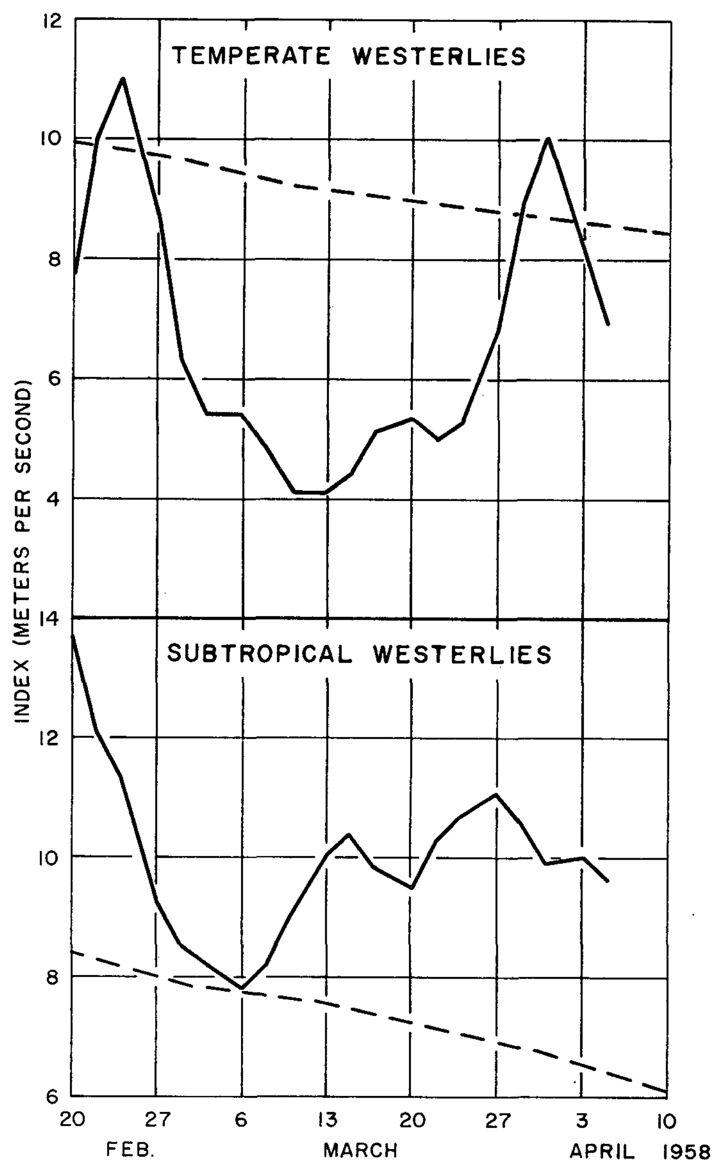


FIGURE 1.—Time variation of speed of 700-mb. westerlies averaged over the Western Hemisphere for temperate zone (35°–55° N.) above, and subtropical zone (20°–35° N.) below. Solid lines connect 5-day mean index values (plotted at middle of period and computed three times weekly) and dashed lines show variation of corresponding normal.

LONGITUDINAL DISTRIBUTION OF WEST WINDS

The hemispheric wind speed pattern in figure 3 can be used to outline longitudinal sections contributing most to the latitudinal features just described. In March the maximum westerly belt was north of its normal position (dashed) in the central Pacific, where it dipped sharply southward about 800 miles off the Oregon coast. The jet passed extremely far south of the normal path over North America and well into the Atlantic Ocean.

Temperate westerly deficit is indicated in the field of monthly mean 700-mb. height departures from normal (DN) over the Western Hemisphere (fig. 4, dotted lines). The region containing strongest easterly DN flow (and therefore lowest index) between 35° and 55° N. included North America, with strong Canadian blocking and maximum westerlies depressed far to the south.

BLOCKING

High-latitude blocking strongly influenced the abnormal behavior of circulation features just described, since large areas of positive 700-mb. DN were paired with related negative areas at lower latitudes. The center of positive 700-mb. anomaly (710 feet) located near Hudson Bay was the most intense ever observed in March over North America (26 years of record). A strong bridge of positive DN extended westward from the center to a smaller 320-foot center at 50° N., 160° W. The negative anomaly field south of this extensive block was also oriented east-west from a weak center 400 miles north of Hawaii through a 210-foot center just off the California coast. Eastward from this center the channel exceeded 160 feet in depth from 30° N. to 35° N. across the southern United States, strengthening near the Atlantic Coast to a 360-foot center 600 miles southeast of Newfoundland. From that point east-northeastward across the Atlantic the negative channel remained quite strong but blocking was less pronounced with weaker easterly DN flow to its north.

MEAN CONTOUR PATTERN

Figure 4 shows that four mean troughs existed at middle and low latitudes in March, one more than in February, and all displaced far from February positions (fig 5 of [2]). Much of the displacement can be attributed to the development of an Asiatic coastal trough and associated eastward readjustment downstream. Trough tilt was negative in the eastern Pacific, off the North American west coast, and in the southwestern Atlantic. Both the negative tilt and ridge weakness between the troughs were related to strong blocking over North America and fast low-latitude westerlies.

Over the Eastern Hemisphere in February (fig. 5 of [2]), the wavelength was extremely long between middle-latitude troughs in western Asia and the central Pacific. This condition was relieved as the Asiatic coastal trough developed from February to March, and a portion of the trough in western Asia retrograded into Europe.

3. UNITED STATES TEMPERATURE ANOMALIES

Warming over the Southeast accompanied rising temperate index in late February after a winter of record-breaking cold [2]. With rapidly falling index early in March (fig. 1), temperatures began sliding downward in the Southeast and by mid-month were again well below normal. Figure 5 is convenient for comparison of temperature anomalies for February and March. Warming relative to normal occurred over much of the Southeast

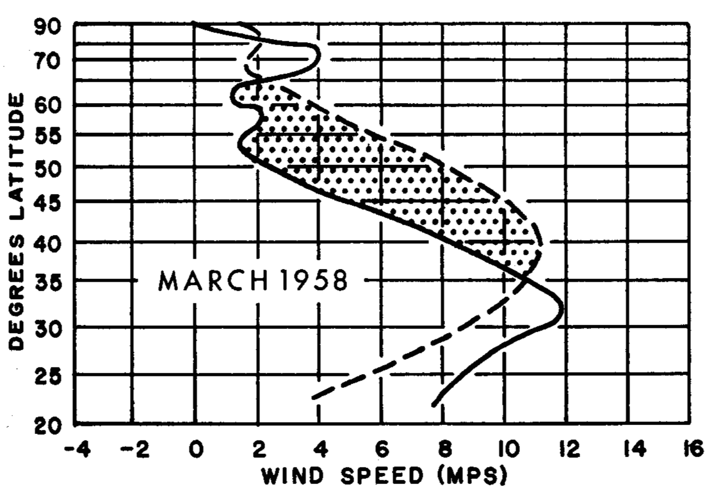


FIGURE 2.—Mean 700-mb. zonal wind speed profile in the Western Hemisphere for March 1958 (solid) and March normal (dashed). Westerlies were weaker than normal (stippled) from 35° to 60° N. with a pronounced maximum near 32° N.

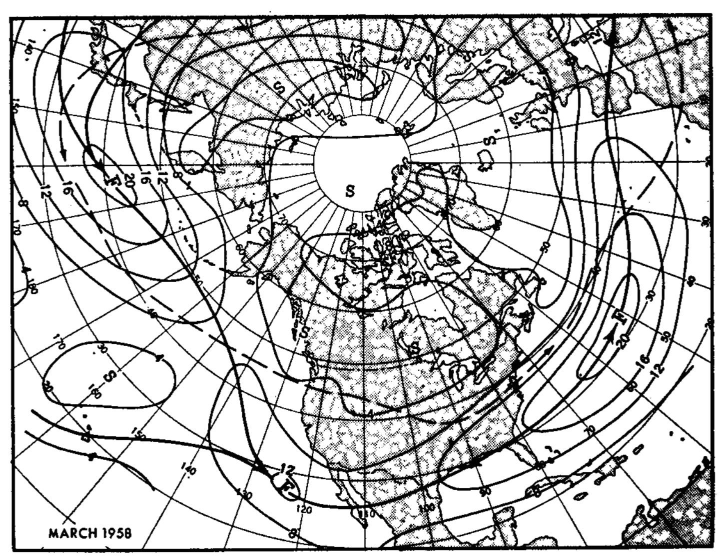


FIGURE 3.—Mean 700-mb. isotachs for March 1958 in meters per second. Solid arrows are drawn through axes of the mean jet stream at the 700-mb. level and dashed arrows through the normal for March.

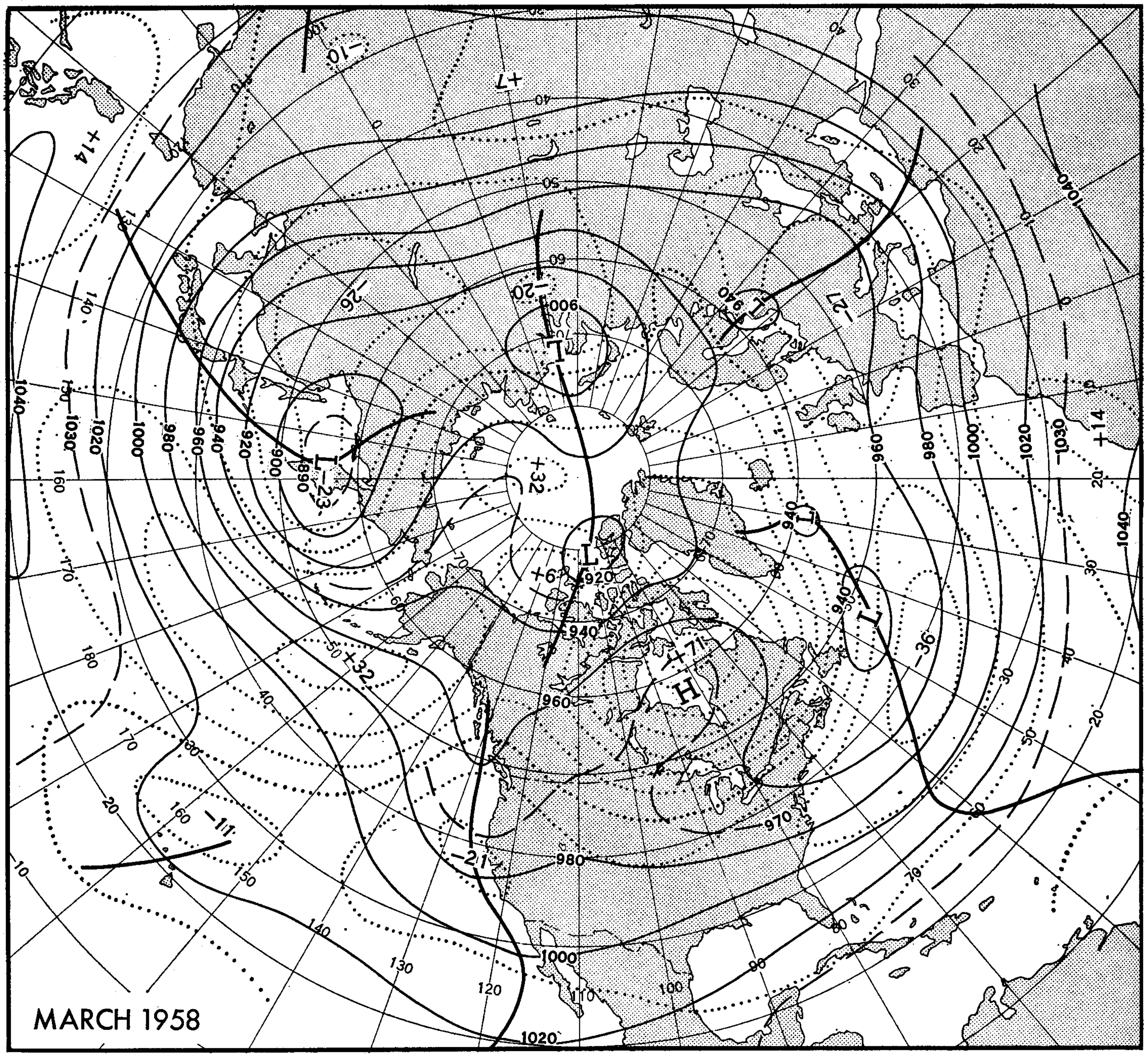


FIGURE 4.—Mean 700-mb. contours (solid) and height departures from normal (dotted), both in tens of feet, for March 1958. Note the large positive departures from normal from eastern Canada to the northeastern Pacific and across Greenland to the Polar Basin.

and from New England to the northern Great Plains. West of the Mississippi more extreme differences were apparent with only remnants of February's above normal temperatures remaining. These changes combined to produce a zonally oriented March pattern, predominantly warm in States along the northern border, and cool elsewhere. The February pattern on the other hand was meridional, mostly warm in the West and cold in the East.

Each of these pattern changes is readily explained in terms of monthly mean circulation. Cooling in the West accompanied lower anomaly values of 700-mb. height (fig. 4) and 700–1000-mb. thickness (fig. 6) of some 200 feet from February. At the same time the 700-mb. jet (fig. 3) became well organized far south of its normal position, and cyclone paths (Chart X) behaved similarly. Much of the cooling just east of the Continental Divide was associated with abnormal upslope DN components from sea level to 700 mb. (figs. 4, 6, and Chart XI inset).

Canadian air penetrated the country almost continuously (Chart XI), but more in the form of ridge extensions from the Canadian High than as strong migratory Highs (Chart IX). This may account for the smaller number of record low temperatures on a daily basis as compared to monthly means. At only two places did daily lows

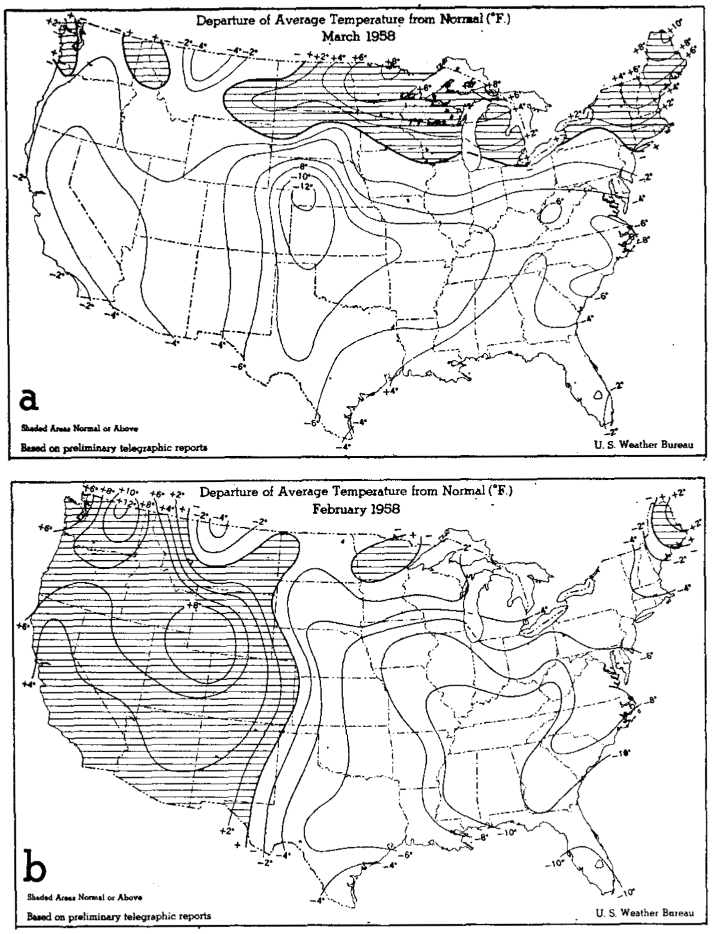


Figure 5.—Departures of average surface temperature from normal (° F.) for March (a) and February (b). (From *Weekly Weather and Crop Bulletin, National Summary,* vol. XLV, Nos. 14 and 9 April 7 and March 3, 1958.)

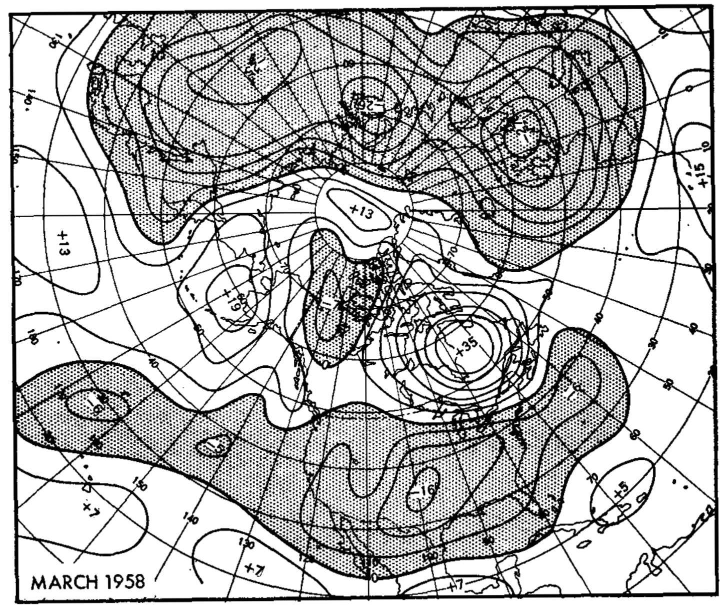


Figure 6.—Departure from normal of mean thickness (1000–700 mb.) for February 1958 with subnormal areas shaded. Isoline interval is 50 feet, and centers are labeled in tens of feet. Stations reporting record low temperatures for the month were clustered near the −160-foot center over Oklahoma.

break records, Red Bluff, Calif. and Evansville, Ind.; while monthly averages were the lowest ever observed at Goodland, Kans., and Amarillo, Austin, and Wichita Falls in Texas. North Platte, Nebr. recorded the lowest March average since 1912; Tulsa, Okla., and Abilene and Fort Worth, Tex. the lowest since 1915. These stations were all located near the area of largest negative 700–1000-mb. thickness departure from normal over the United States (fig. 6). Many stations in the lower Mississippi and Ohio Valleys and most stations in North Carolina had their coldest weather since 1947.

Abnormal warmth eastward from Montana through New England was partly due to the warmth of the source region, where 700–1000-mb. thicknesses for the month averaged 350 feet above normal (fig. 6) beneath the great blocking anticyclone over eastern Canada. Another factor was the advection of warm Atlantic air at low levels (Chart XI) around the bottom of the High. Caribou, Maine was greatly influenced by the latter effect, reporting a record high average for March.

4. PRECIPITATION

Changes in precipitation pattern from February (not shown) to March (Chart II) were small compared to temperature. March was significantly wetter east of the Divide from Wyoming to the Texas Panhandle, with DN components in the lower troposphere directed upslope. Southern Texas was drier under a foehn regime with slightly stronger than normal mean westerlies over the Divide (fig. 3), but the southeastern portion of the country had more precipitation than in February. In the Southeast much of the precipitation came with overrunning Gulf air carried into the country by cyclones traveling along depressed paths (Chart X).

West coast precipitation was copious under the influence of the mean trough in that area (fig. 4), but total amounts were somewhat smaller than in February. March records were broken however, at Blue Canyon, San Francisco, Oakland, and Fresno, Calif. Other record March totals were measured at Albuquerque, N. Mex. and Atlantic City, N. J., and the accumulation at Fort Myers, Fla. was the largest since March 1852. Record snowfall was reported at widely separated stations including Ely, Nev., Winslow, Ariz., El Paso, Tex., Springfield, Mo., Dayton, Ohio, Reading, Pa., and Wilmington, Del. Sunshine was the least ever recorded for March at one station in each of the 12 States: Maine, Massachusetts, Connecticut, Virginia, Tennessee, Ohio, Arkansas, Kansas, Nebraska, Colorado, Wyoming, and North Dakota.

Drier conditions prevailed over the northern tier of States and in parts of Illinois, Iowa, and South Dakota. This area was under the influence of predominantly anticyclonic circulation and was affected by few storms (Chart X). March totals were the smallest on record at Olympia and Stampede Pass, Wash., Fargo, N. Dak., Moline and Peoria, Ill., East Lansing, Mich., and Rochester, N. Y.

5. EVOLUTION WITHIN THE MONTH

A series of 5-day mean 700-mb. charts is displayed in figures 7 through 10 to illustrate circulation and weather behavior during individual weeks in March. These maps were selected to fit the weekly periods given in the *Weekly Weather and Crop Bulletin* temperature and precipitation maps.

First week, March 4–10.—During the first week, the 700-mb. zonal index (fig. 1) was falling rapidly. After brief recovery to normal values in late February, the index declined to its lowest value in the March cycle on the 10th. Strong blocking ridges and deep low-latitude mean troughs (fig. 7a) were predominant in Western Hemisphere circulation this week. The large blocking area with central anomaly +920 feet in Davis Strait and the deep negative area centered southeast of Newfoundland produced strong easterly DN flow into the Maritime Provinces. Over the eastern Pacific blocking was less pronounced than in Canada but still quite strong.

A Kona storm associated with the mean Low (−290 ft.) near the Hawaiian Islands produced a deluge at Honolulu. All records for 24-hour rain in downtown Honolulu were shattered by a total of 17.41 inches from 3:00 a. m. on the 5th to 3:00 a. m. on the 6th. At the airport the largest 24-hour total was 17.07 inches and the storm total, 18.51 inches, was an all time record for any month. While Oahu was most strongly affected by the storm, Maui totals were high on the 6th and 7th. The 2-day total at Lahaina, on windward Maui, was 4.11 inches, while the normal expected in March is 1.59 inches. Five-day circulation features attending this storm and the Kona storm of January 1957 [3] were similar in many respects over the Pacific. In both cases strong blocking dominated the circulation at Hawaiian longitudes with strong negative DN centers just northwest of the Islands, surmounted by large areas of positive DN centered just south of Alaska.

The mean trough over western United States was strongest in the South where considerable precipitation in Arizona and New Mexico attended passage of two Lows along a depressed cyclone path (Chart X). Overrunning Gulf air northward and eastward from the southern Texas foehn area (fig. 7c) accounted for sizable amounts from Kansas and Oklahoma to the Georgia coast.

Temperatures (fig. 7b) in the Pacific Northwest averaged below normal for the first time in several weeks. Most of the country cooled from the previous week, though some warming occurred in the Gulf States, northern New England, and a portion of North Dakota.

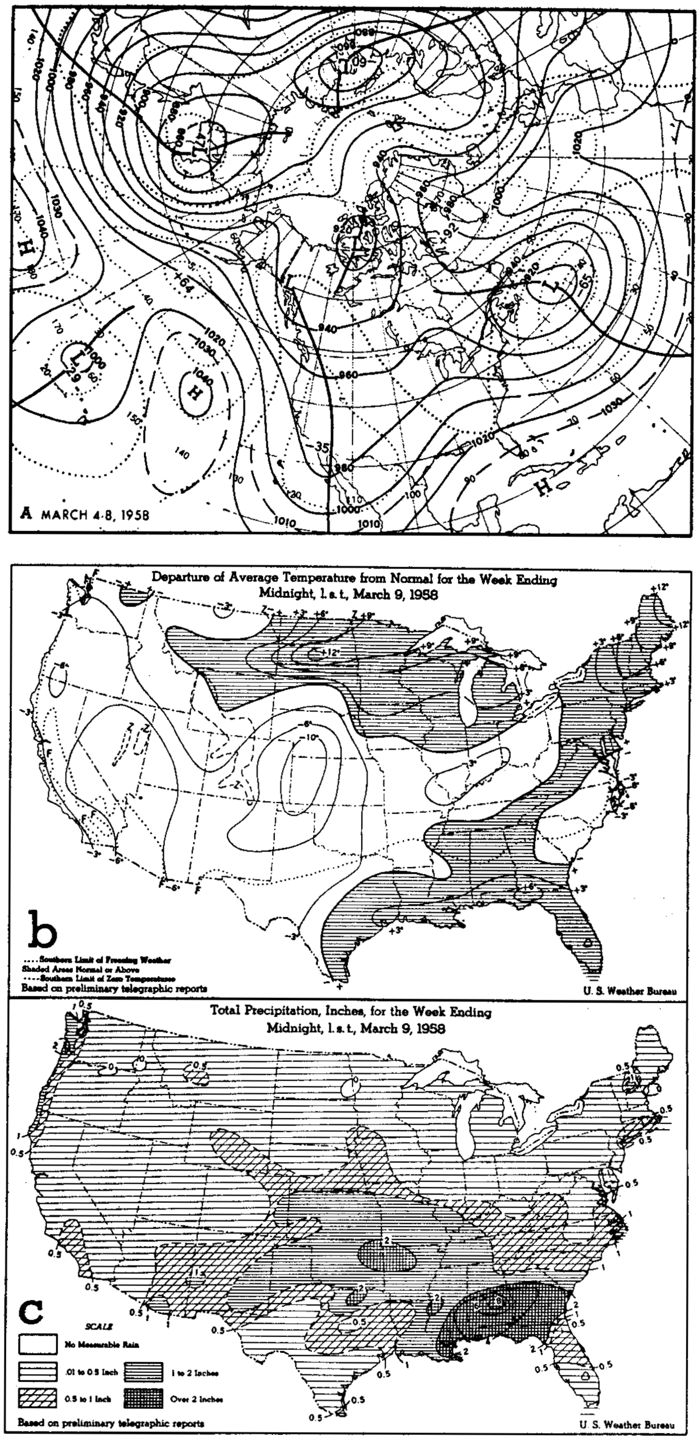


FIGURE 7.—(a) 5-day mean 700-mb. contours (solid) and height departures from normal (dotted) in tens of feet. This chart represents the circulation for the week ending March 9. (b) and (c) Departure of average surface temperature from normal (° F.) and total precipitation (inches) for the week ending March 9, 1958. (From *Weekly Weather and Crop Bulletin, National Summary,* vol. XLV, No. 10, March 10, 1958.)

Second week, March 11–17.—Positive 700-mb, anomalies (fig. 8a) spread westward over Canada by mid-week, and joined a large center over Hudson Strait to another in the Gulf of Alaska. The mean trough near Hawaii shifted toward the retrograding west coast trough, and a negative DN channel intensified zonally across southern United States. Part of the western Atlantic trough retrograded into Canada, but the southern portion advanced to join

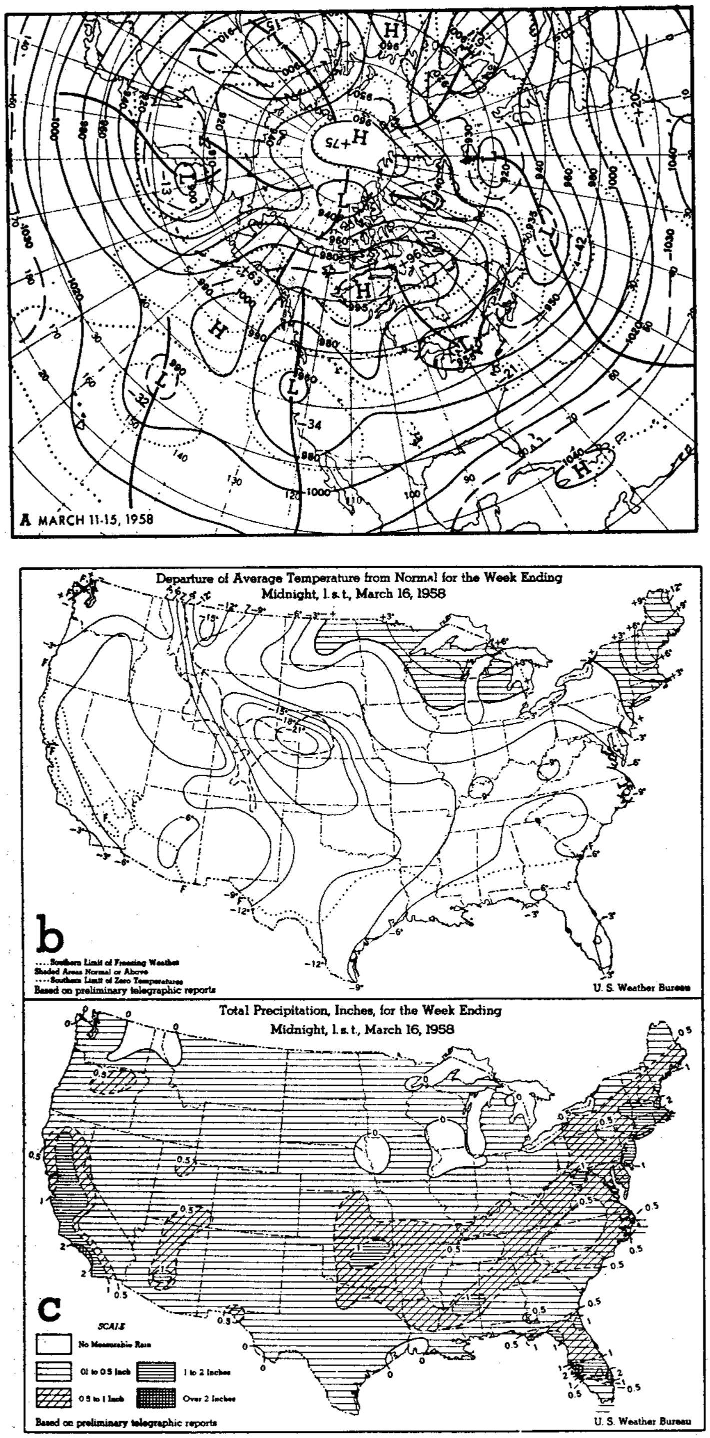


Figure 8.—(a) 5-day mean 700-mb. contours and departures from normal. (b) and (c) Surface temperature departure from normal (° F.) and total precipitation (inches) for week ending March 16, 1958. (From *Weekly Weather and Crop Bulletin, National Summary*, vol. XLV, No. 11, March 17, 1958.)

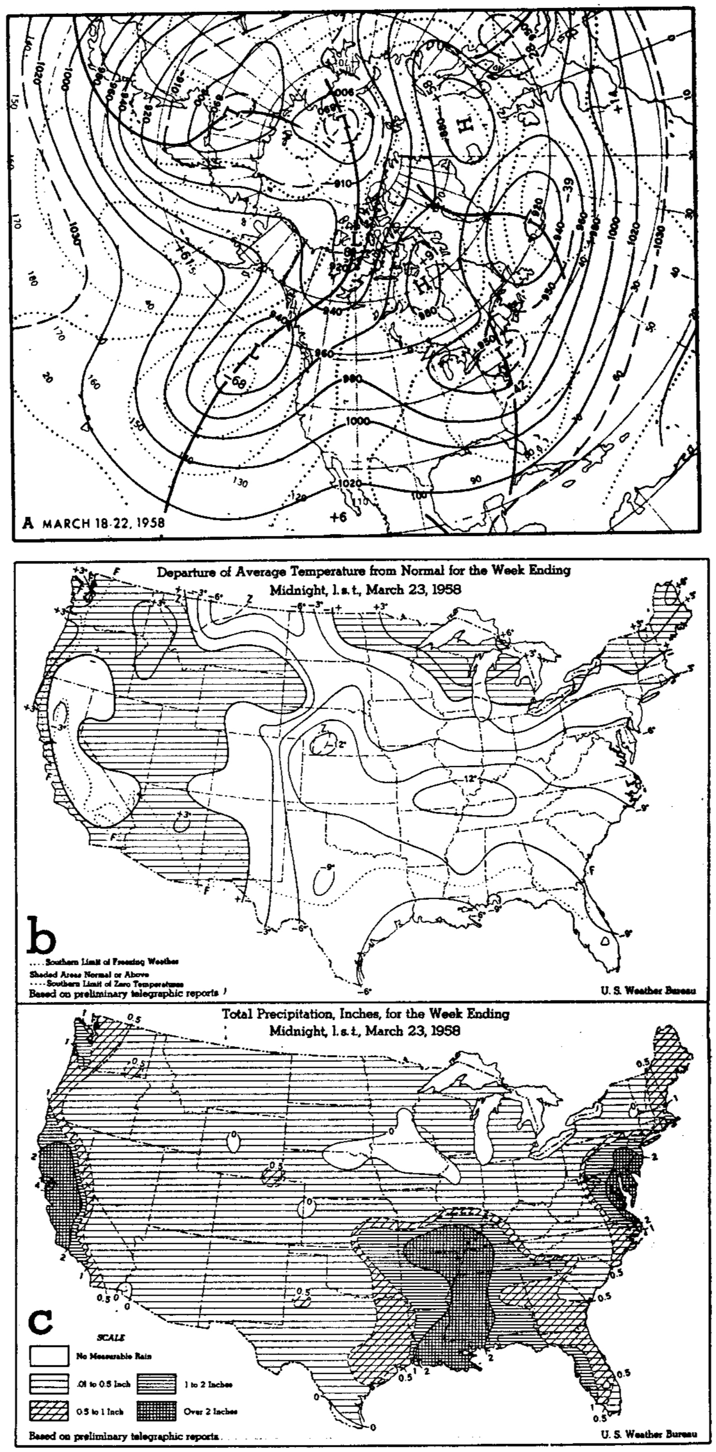


Figure 9.—(a) 5-day mean 700-mb. contours and departures from normal. (b) and (c) Surface temperature departure from normal (° F.) and total precipitation (inches) for week ending March 23, 1958. (From *Weekly Weather and Crop Bulletin, National Summary*, vol. XLV, No. 12, March 24, 1958.)

with a new trough near Iceland. Temperate westerly index was low, but rose slowly during the period.

With strong blocking across western Canada this was a cold week over the United States (fig. 8b), and only New England, the northern Lakes Region and part of the northeastern Plains were warmer than normal. It was extremely cold along the eastern slopes of the Continental Divide under a tongue of the sea level Canadian High. Goodland, Kans., reported this week the coldest of the winter season.

Figure 8c shows that areas of precipitation in excess of an inch generally were small and widely separated. The

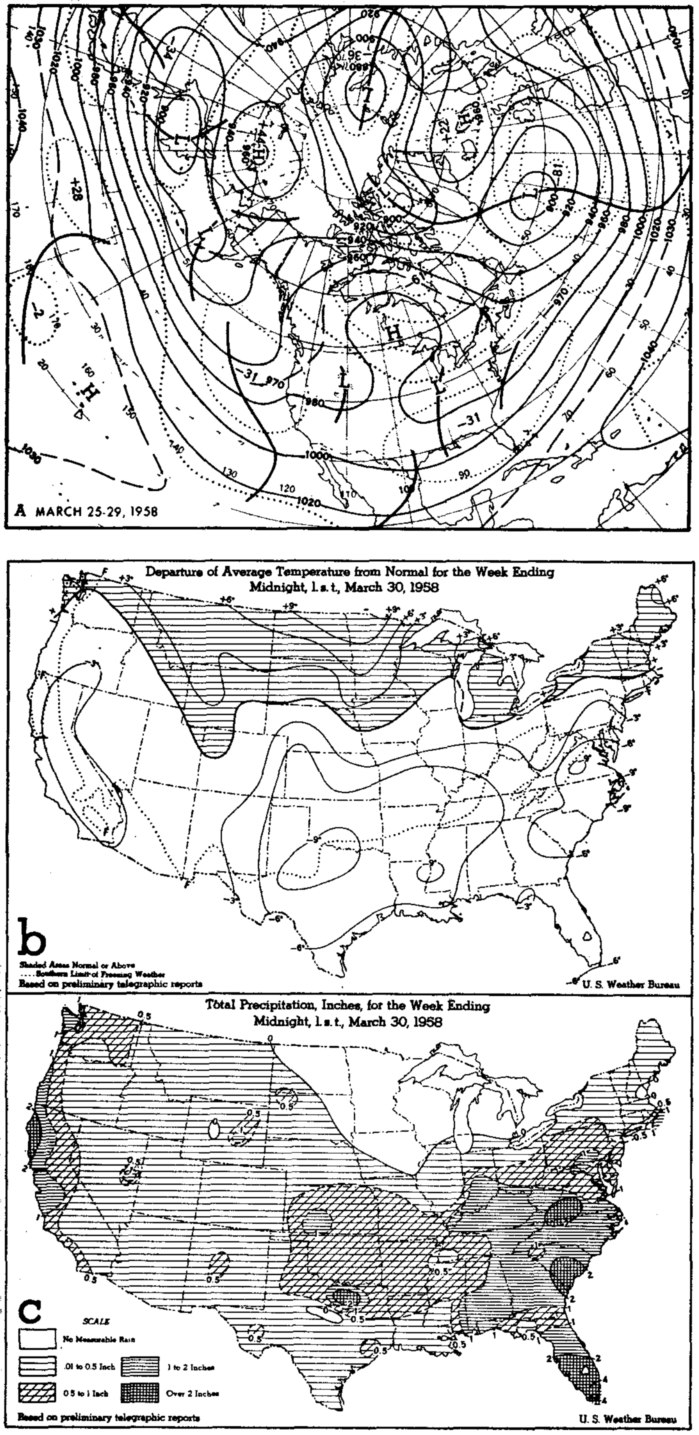


FIGURE 10.—(a) 5-day mean 700-mb. contours and departures from normal. (b) and (c) Surface temperature departure from normal (° F.) and total precipitation (inches) for week ending March 30, 1958. (From *Weekly Weather and Crop Bulletin, National Summary,* vol. XLV, No. 13, March 31, 1958.)

largest occurred in California near the mean trough and in New England under the influence of onshore cyclonic flow (fig. 8a). Snowfalls of 5 to 7 inches were recorded in Kansas, Oklahoma, and Texas, while larger amounts fell in the Northeast. Twelve-inch falls were measured in eastern New York with up to 2 feet in mountain sections and as much as 20 inches in northwestern Connecticut. Most of the snow was produced by a storm which deepened in the Gulf near mid-week and moved up the east coast over the weekend.

Third Week, March 18–24.—By the middle of the third week the two eastern Pacific mean troughs shown in figure 9a had joined to form a single vigorous system flanked by large-amplitude ridges. Downstream, the Atlantic mean trough had strengthened and retrograded to the east coast. The ridge connection with weak positive anomalies from Lower California to the large positive area over Canada represented a major change in the DN pattern over the United States. Thus the zonally oriented DN fields of the previous week had become much more meridional over North America, but the hemispheric index changed only slightly.

Temperature anomalies in the western United States (fig. 9b) reflected the reorientation of DN flow described above and rose several degrees from border to border. Less change occurred over the eastern half of the country, but in the southeastern quarter of the country anomalies were cooler as the mean trough intensified along the east coast.

The largest weekly contribution to several record monthly rainfall totals in California was made during this period (fig. 9c) in strong southwesterly flow ahead of the deep eastern Pacific trough. San Francisco reported over 4 inches, and more than 2 inches fell at Fresno. An area of more than an inch extended northward from the central Gulf Coast to Illinois and another protruded into the Middle Atlantic States from the coast.

The latter area is of particular interest since most of the totals were the product of a violent snowstorm associated with the strong east coast trough. This storm meandered up the east coast from the 19th to the 22d with gale- to hurricane-force winds, heavy rain and snow, and high tides. Snowfall ranged from 1 to 3 feet over much of the area from Virginia to New England. 29 inches was reported at Mount Airy, Md., up to 40 inches from interior sections of Pennsylvania, and up to 35 inches in New Jersey. The storm was described as the worst in 40 years in parts of Pennsylvania and the worst of the season in other sections, damaging power and telephone lines over a wide area. A more comprehensive study of the storm is made in the adjoining article by Sanderson and Mason [4].

Fourth Week, March 25–31.—Flat westerly flow at middle latitudes of the Pacific (fig. 10a) provided the major contribution to rising zonal index (fig. 1) this week. Temperate westerlies reached a peak value of just over 10 m. p. s.—above normal for the first time this March. Blocking was weaker but continued extensive over North America, with the mean flow strongly difluent downstream from the eastern Pacific trough. Atlantic westerlies south of 50° N. increased with intensification of the mean trough to a central negative anomaly value of 810 feet east of Newfoundland.

700-mb. DN flow over the United States was again oriented east-west, as were temperature anomalies (fig. 10b), in the pattern characteristic of the month. This was the fourth consecutive week with below normal temperatures over the central and southern Great Plains, where several new low temperature records were established for March.

Additional precipitation this week (fig. 10c) contributed to the record-breaking California totals mentioned earlier, as well as to other record accumulations at Albuquerque, N. Mex. and Atlantic City, N. J. From 1 to 2 inches fell over most of a large area southward from a line between southern Virginia and southern Indiana, as the final Gulf storm of the month moved up the east coast. Precipitation remained light along the northern border and over the northern Plains States for the fourth consecutive week. This is an indication of the stability and extent of the great anticyclone over eastern Canada.

In summary, the largest single feature of the circulation this month was the blocking High over Hudson Bay. High pressure persisted in this area during each week of the month, and the associated monthly mean DN at 700 mb. was the largest ever observed over North America during March. This Hudson Bay High contributed strongly to low 700-mb. temperate westerly index over the Western Hemisphere and had an even greater influence on United States weather.

REFERENCES

1. J. F. O'Connor, "The Weather and Circulation of January 1958—Low Index with Record Cold in Southeastern United States," *Monthly Weather Review*, vol. 86, No. 1, Jan. 1958, pp. 11–18.
2. W. H. Klein, "The Weather and Circulation of February 1958—A Month with an Expanded Circumpolar Vortex of Record Intensity," *Monthly Weather Review*, vol. 86, No. 2, Feb. 1958, pp. 60–70.
3. Paul Stark, "The Weather and Circulation of January 1957—A Month with a Persistent Block in the Gulf of Alaska," *Monthly Weather Review*, vol. 85, No. 1, Jan. 1957, pp. 19–27.
4. A. N. Sanderson and R. B. Mason, Jr., "Behavior of Two East Coast Storms, March 13–24, 1958," *Monthly Weather Review*, vol. 86, No. 3, Mar. 1958, pp. 109–115.

Notice

AVAILABILITY OF 5-DAY MEAN 700-MB. CHARTS FOR A 10-YEAR PERIOD

The U. S. Weather Bureau announces the availability on microfilm of the results of an extensive historical map project carried out in its Extended Forecast Section. These are 5-day mean 700-mb. charts which have been constructed twice a week for the 10-year period from June 1945 to May 1955 on maps covering most of the Northern Hemisphere north of 15° N. latitude. Superimposed on the contours are broken lines showing the departures from monthly normal of the 700-mb. height, where the normal was obtained from the series of charts published by the Weather Bureau in 1952.[1] Individual values of departure from normal are plotted at intersections of latitude and longitude. Owing to lack of space only dots, instead of actual values, are indicated on figure 1, (p. 108) a sample chart which is somewhat less clear than microprints made from the microfilm.

The basic data for these charts were read at these grid points from contours on hemisphere twice-daily synoptic charts at the 700-mb. level. Contours were drawn at 200-foot intervals and departures from normal at 100-foot intervals. In addition, trough lines, centers of high and low height, and centers of high and low departure are indicated on the maps.

The area covered by these charts is less than a full hemisphere for the period from 1945 to 1948, the omitted area being mainly Asia and the western Pacific.

The series contains a total of 1,040 maps. The complete set may be obtained on microfilm (2 reels, MF 2026 A and B) for approximately $8 by writing to the U. S. Weather Bureau, Washington 25, D. C.

[1] U. S. Weather Bureau, "Normal Weather Charts for the Northern Hemisphere," *Technical Paper* No. 21, Oct. 1952, 74 pp.

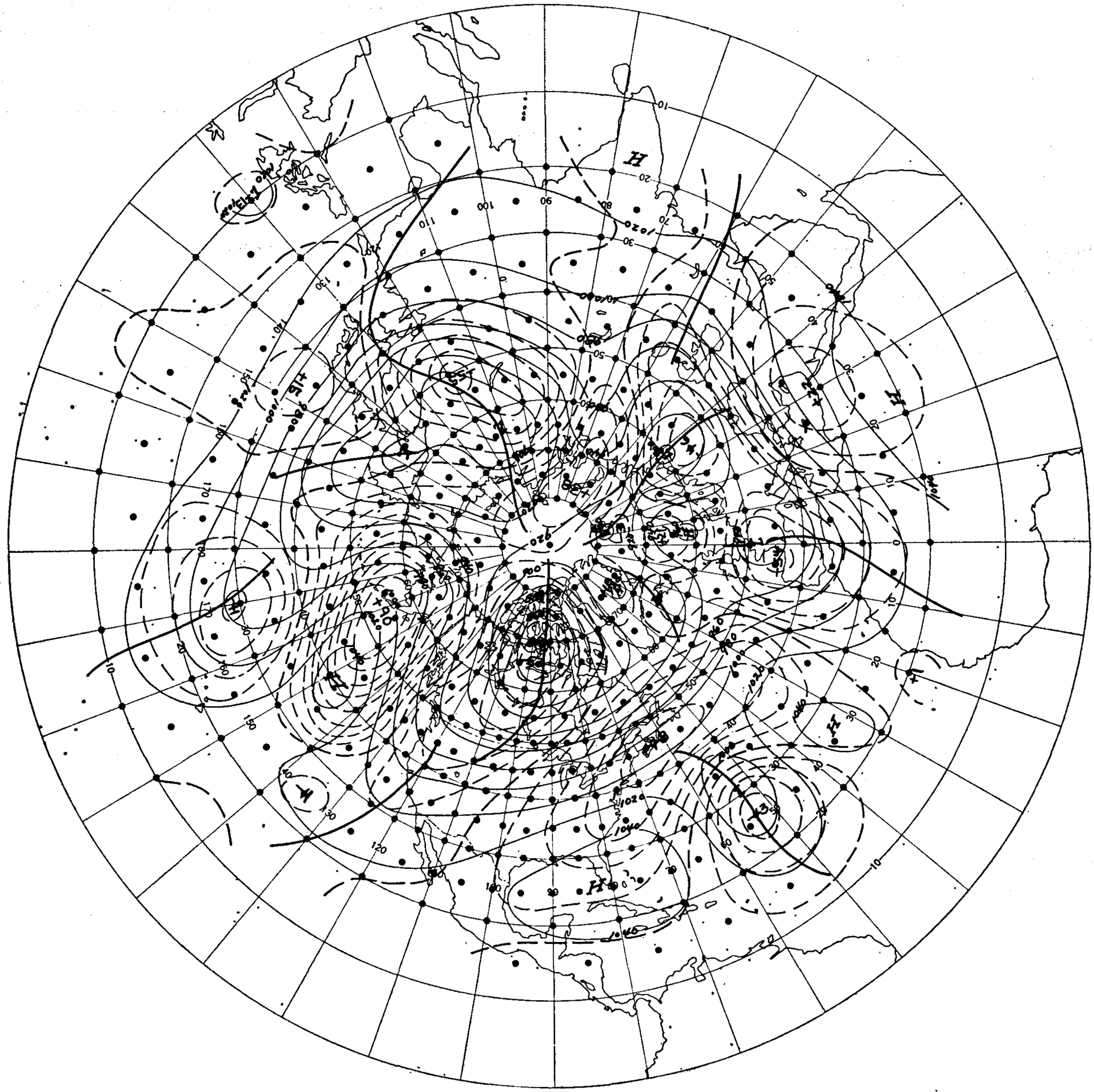
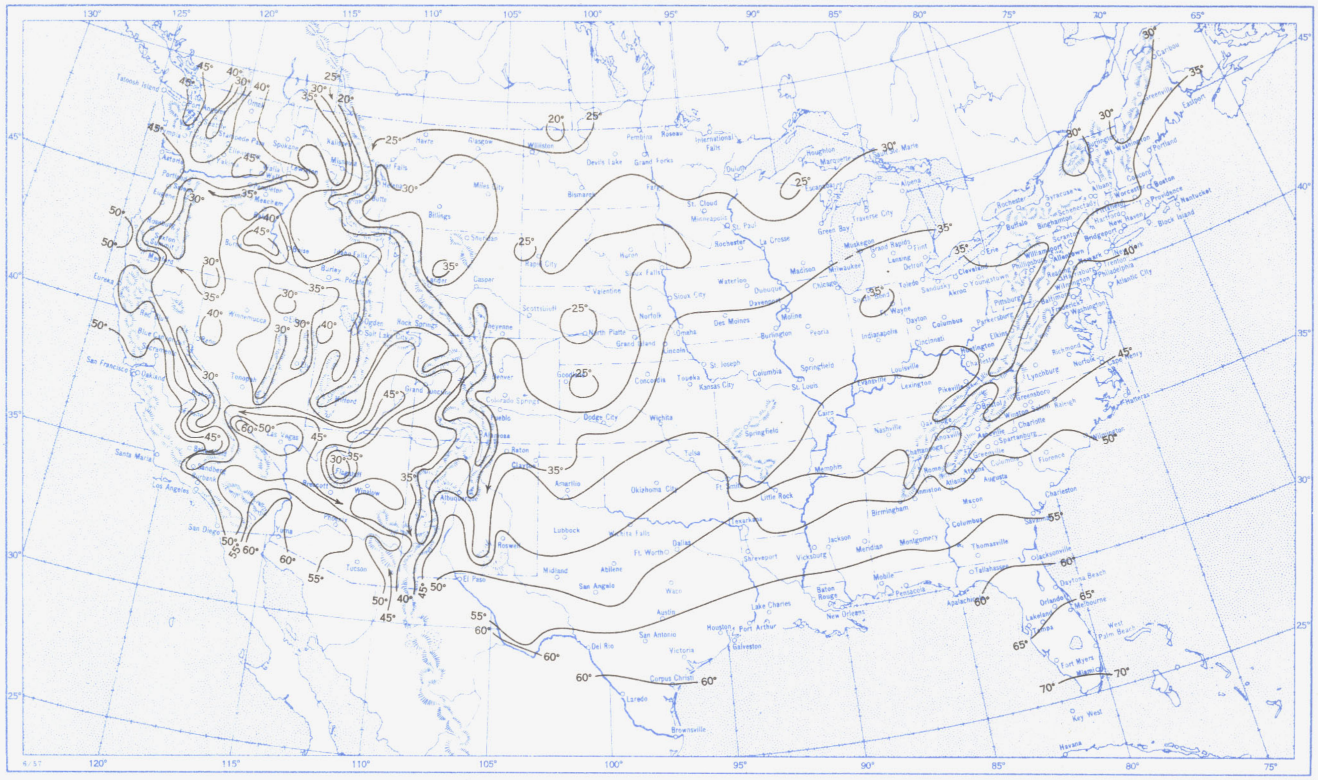
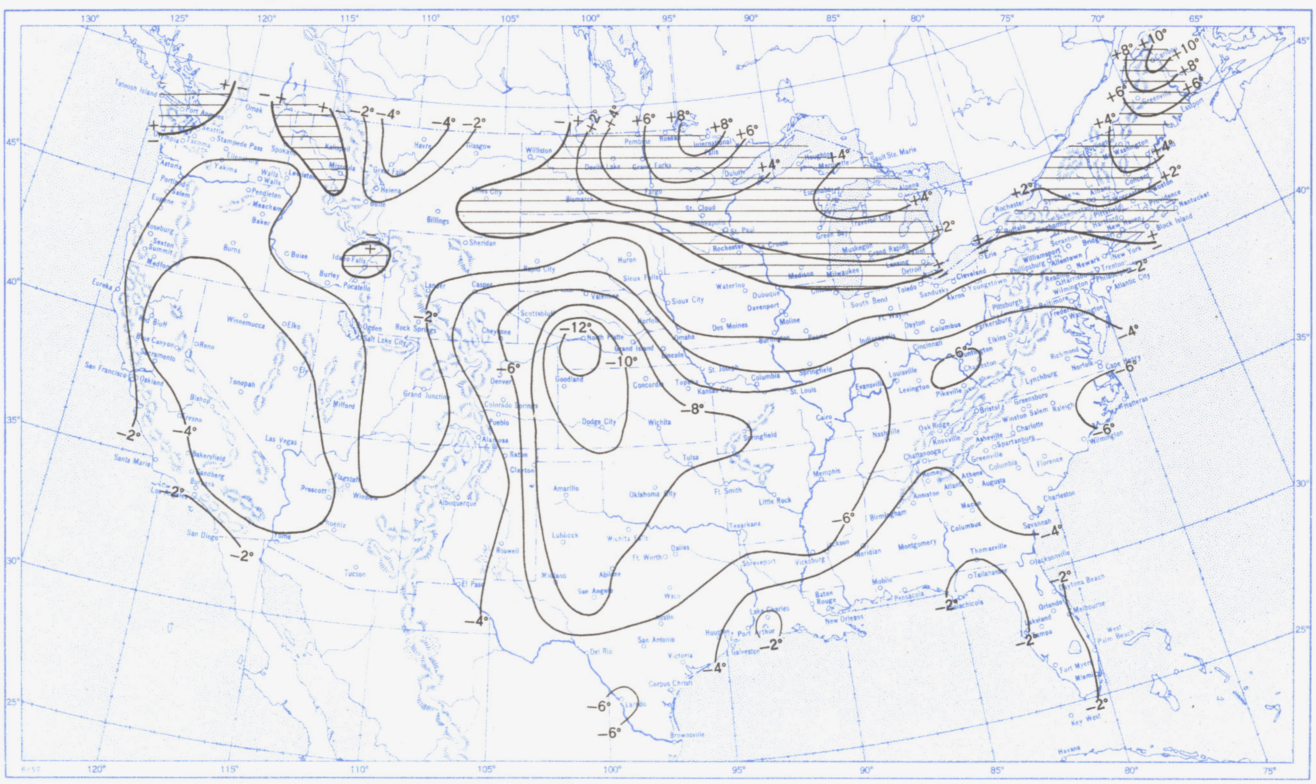


FIGURE 1.—5-day mean 700-mb. contours (solid) for 200-foot intervals and isopleths of departure from normal (broken) for 100-foot intervals for the period Feb. 23–27, 1955. Heavy solid lines indicate troughs as defined by the lowest latitudes reached by contours. Large dots show latitute-longitude intersections at which height departures from normal are plotted.

Chart I. A. Average Temperature (°F.) at Surface, March 1958.



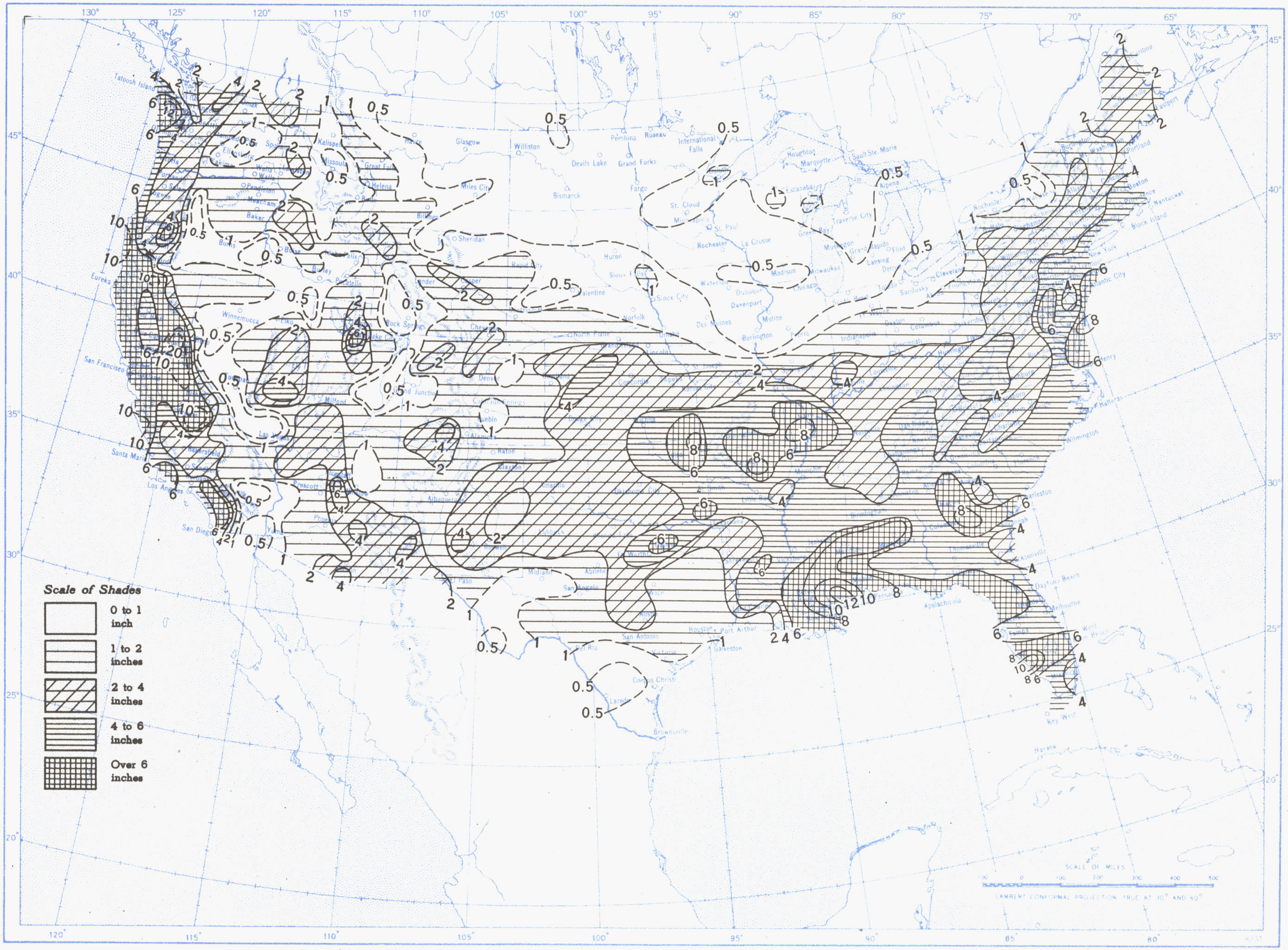
B. Departure of Average Temperature from Normal (°F.), March 1958.



A. Based on reports from over 900 Weather Bureau and cooperative stations. The monthly average is half the sum of the monthly average maximum and monthly average minimum, which are the average of the daily maxima and daily minima, respectively.

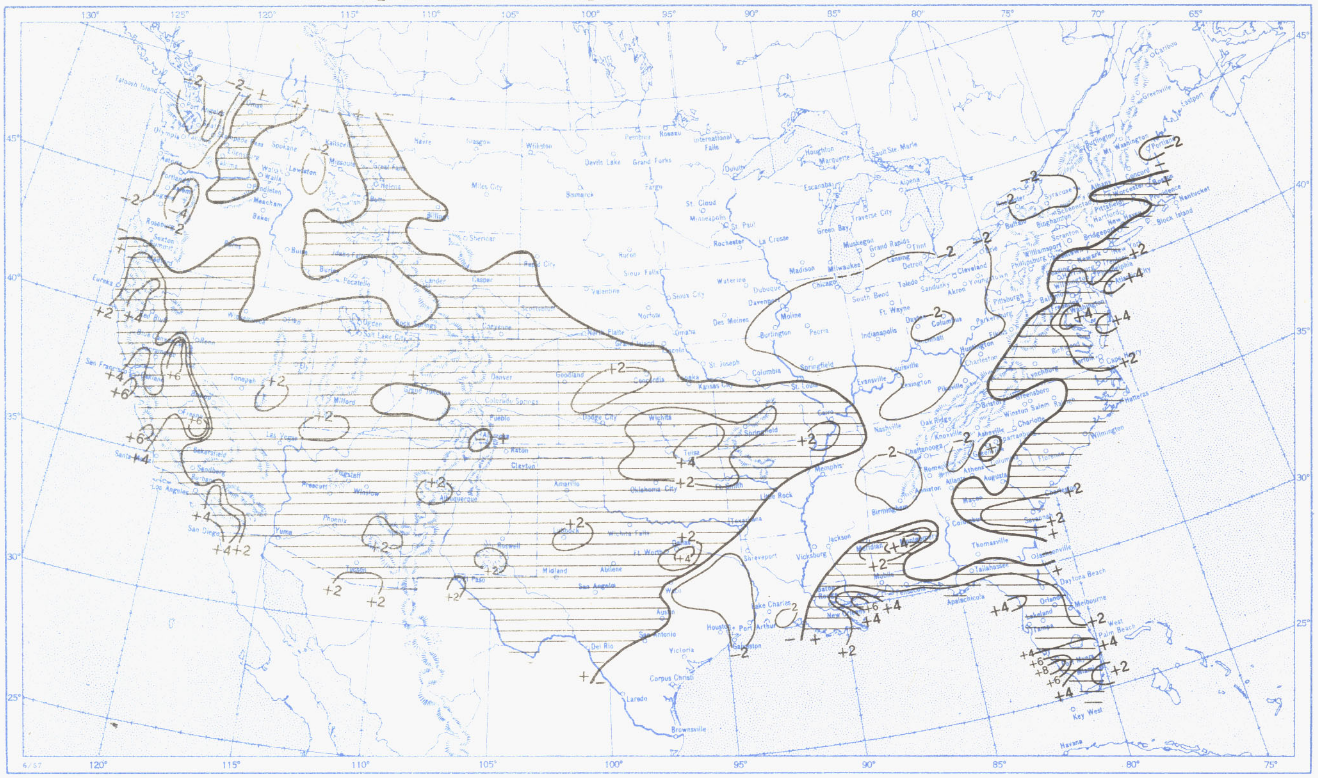
B. Departures from normal are based on the 30-yr. normals (1921-50) for Weather Bureau stations and on means of 25 years or more (mostly 1931-55) for cooperative stations.

Chart II. Total Precipitation (Inches), March 1958.

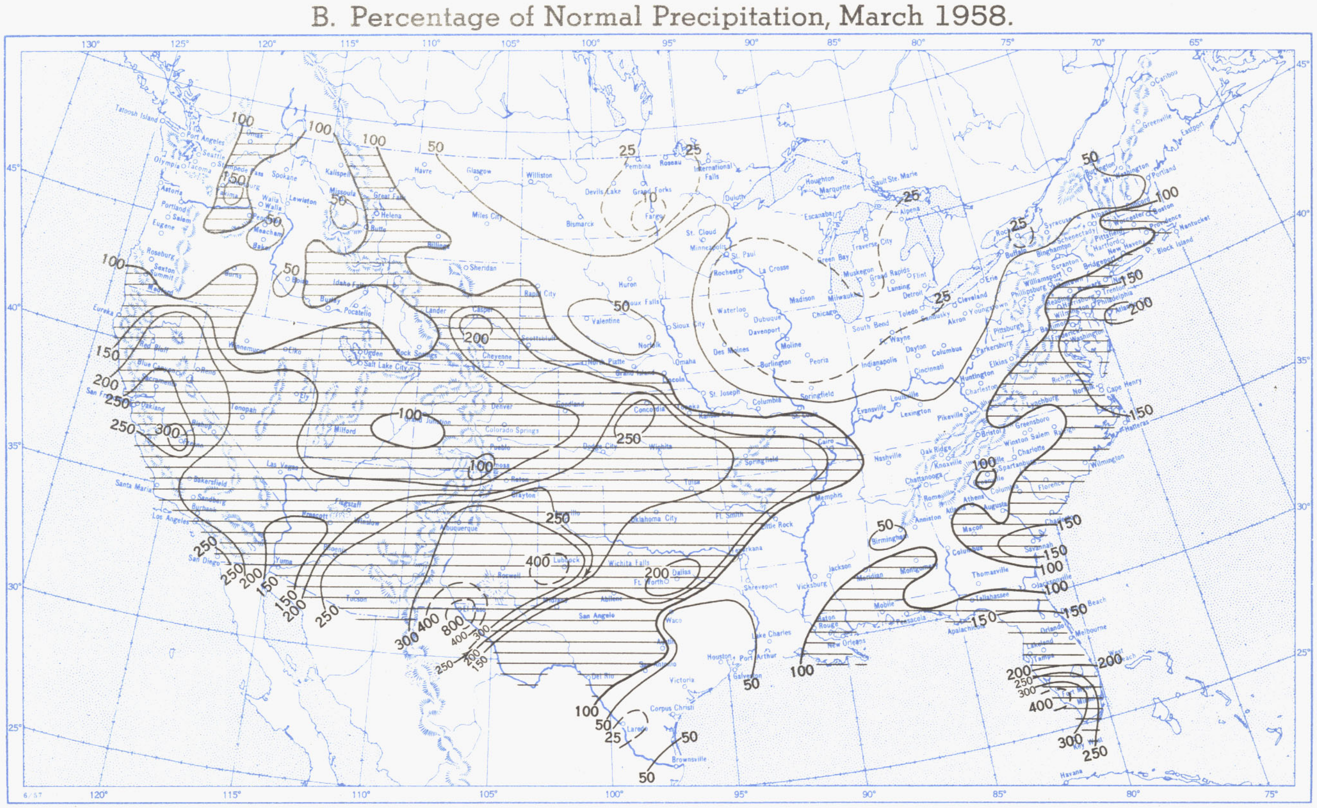


Based on daily precipitation records at about 800 Weather Bureau and cooperative stations.

Chart III. A. Departure of Precipitation from Normal (Inches), March 1958.

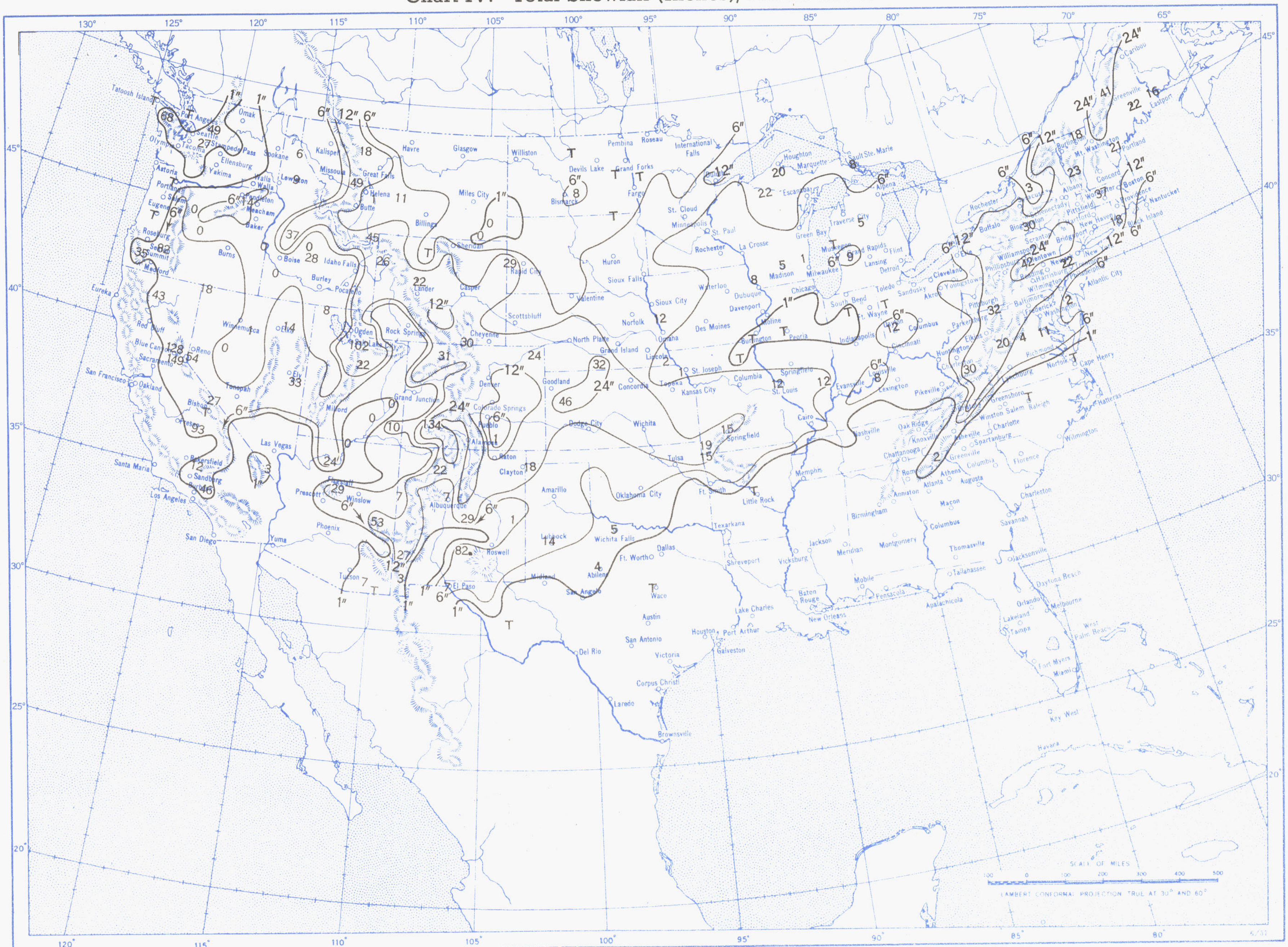


B. Percentage of Normal Precipitation, March 1958.



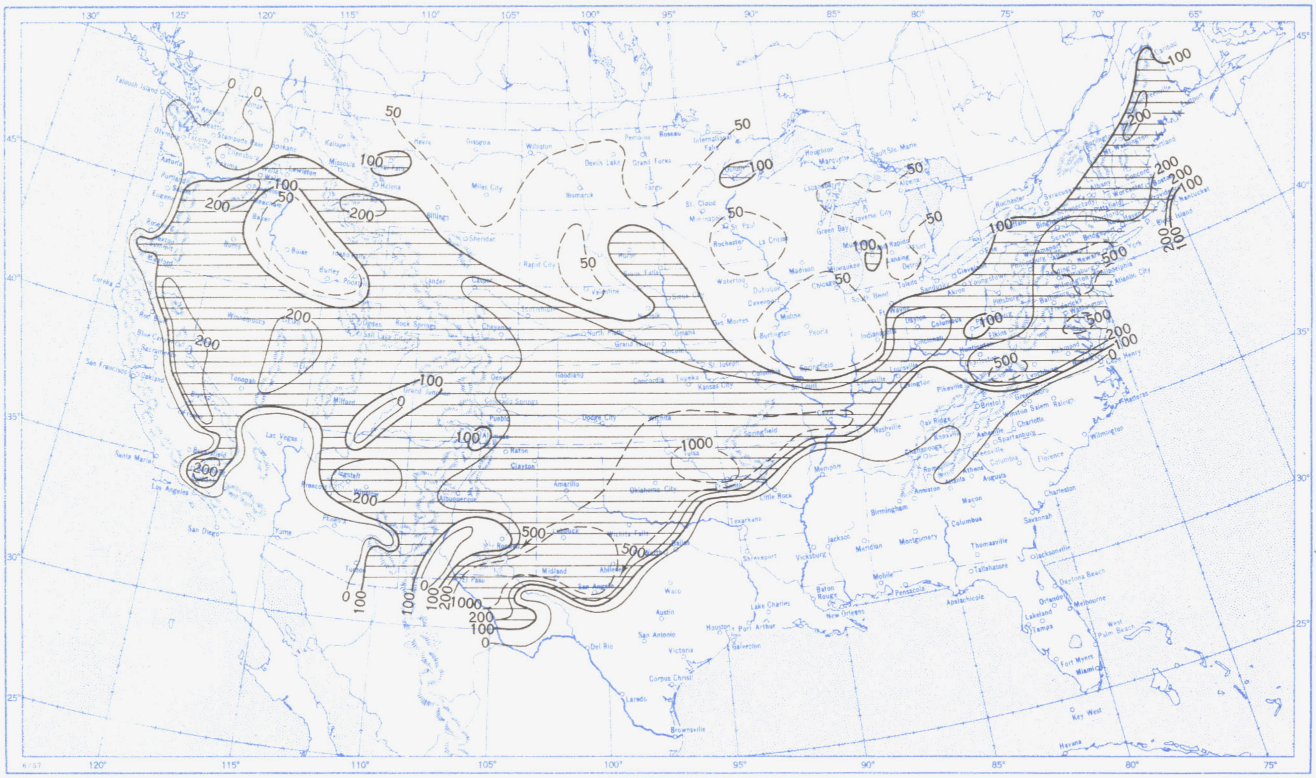
Normal monthly precipitation amounts are computed from the records for 1921-50 for Weather Bureau stations and from records of 25 years or more (mostly 1931-55) for cooperative stations.

Chart IV. Total Snowfall (Inches), March 1958.

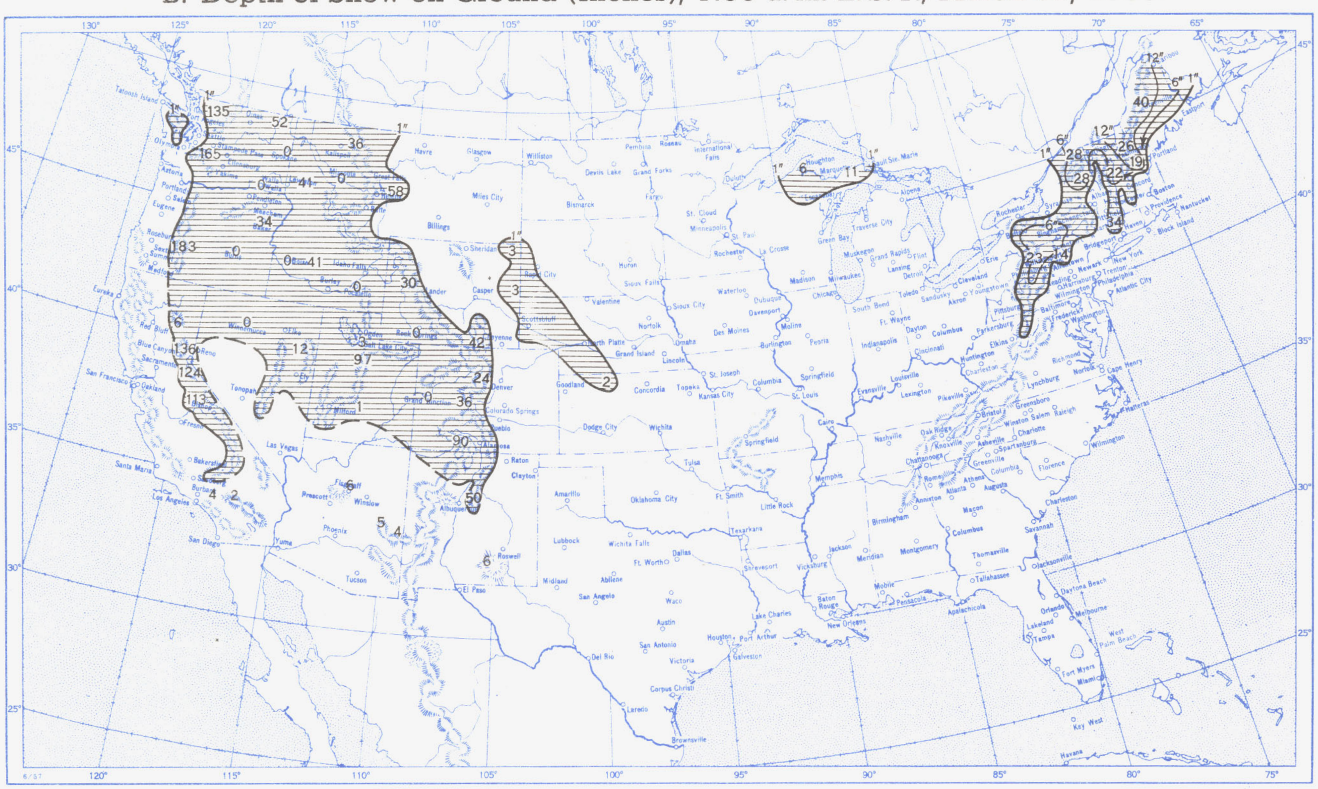


This is the total of unmelted snowfall recorded during the month at Weather Bureau and cooperative stations. This chart and Chart V are published only for the months of November through April although of course there is some snow at higher elevations, particularly in the far West, earlier and later in the year.

Chart V. A. Percentage of Normal Snowfall, March 1958.

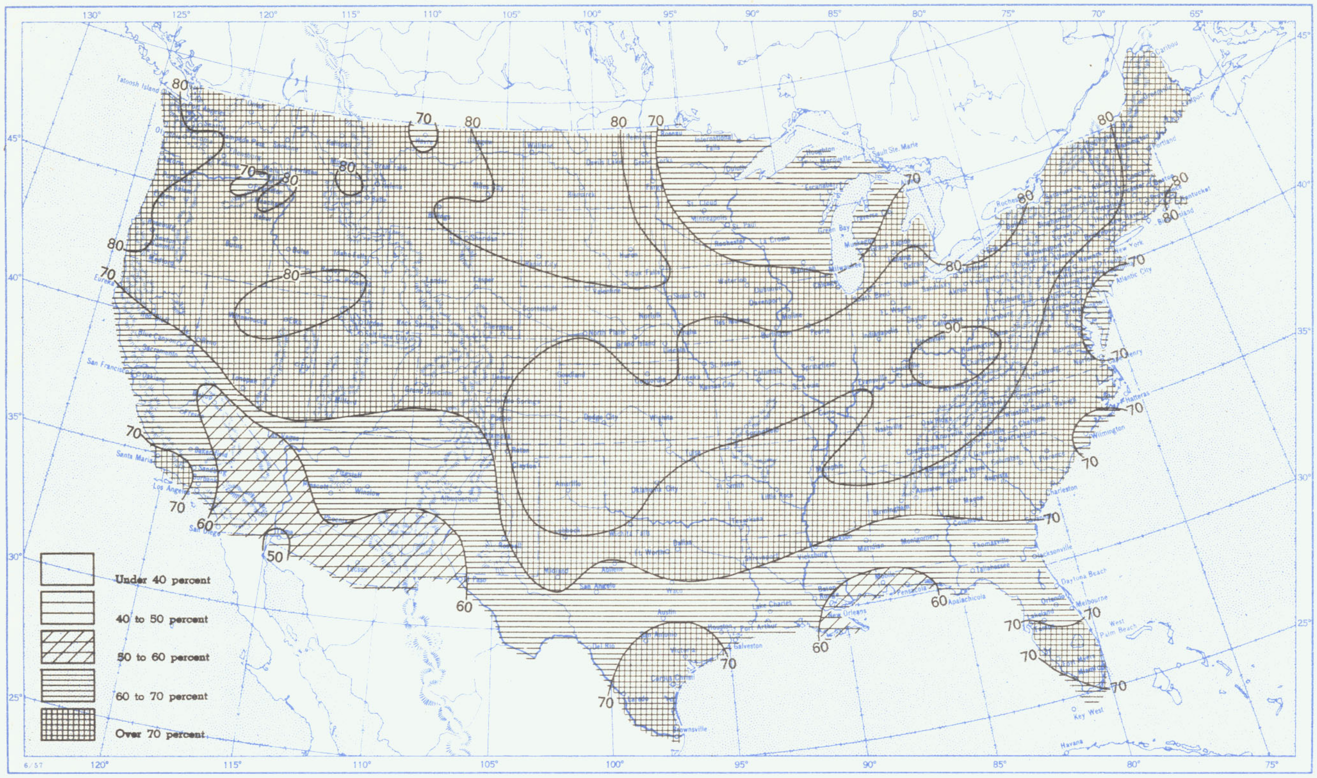


B. Depth of Snow on Ground (Inches), 7:00 a. m. E. S. T., March 31, 1958.

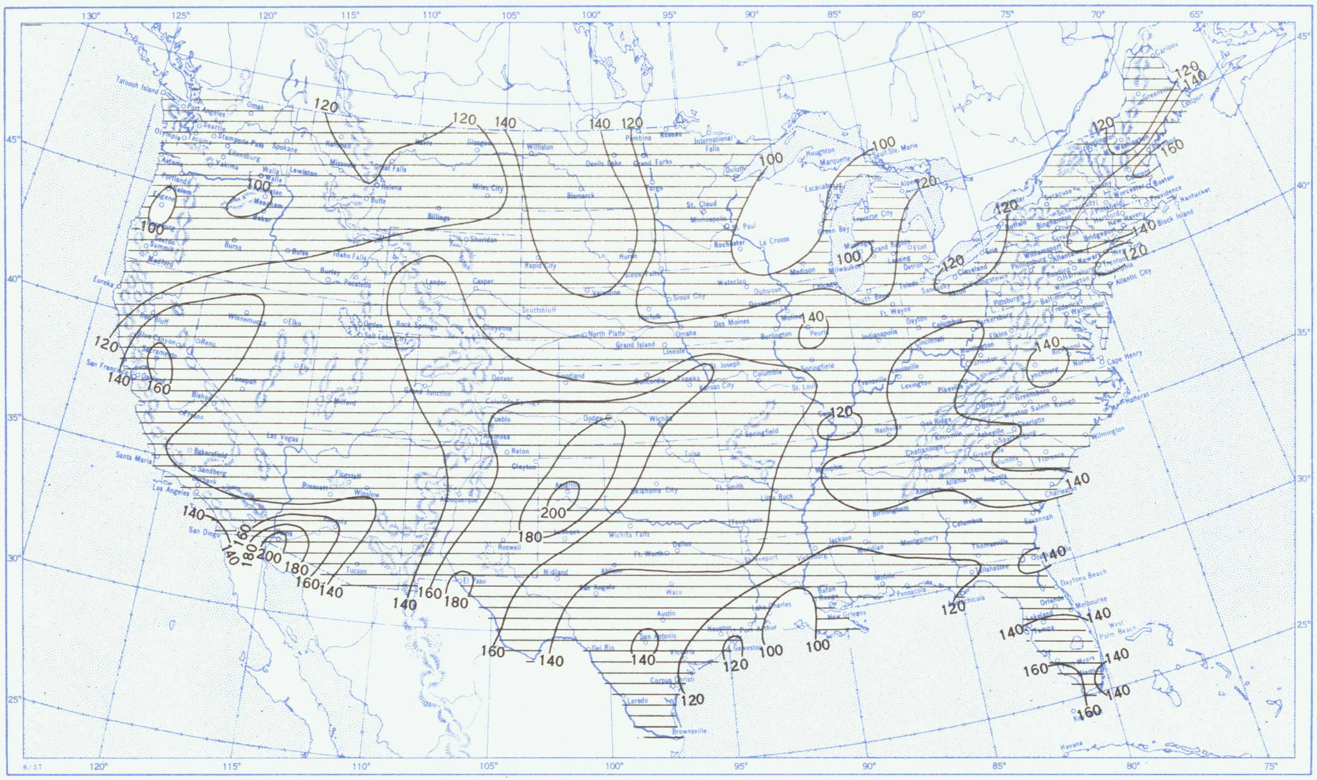


A. Amount of normal monthly snowfall is computed for Weather Bureau stations having at least 10 years of record.
B. Shows depth currently on ground at 7:00 a. m. E. S. T., of the Monday nearest the end of the month. It is based on reports from Weather Bureau and cooperative stations. Dashed line shows greatest southern extent of snowcover during month.

Chart VI. A. Percentage of Sky Cover Between Sunrise and Sunset, March 1958.

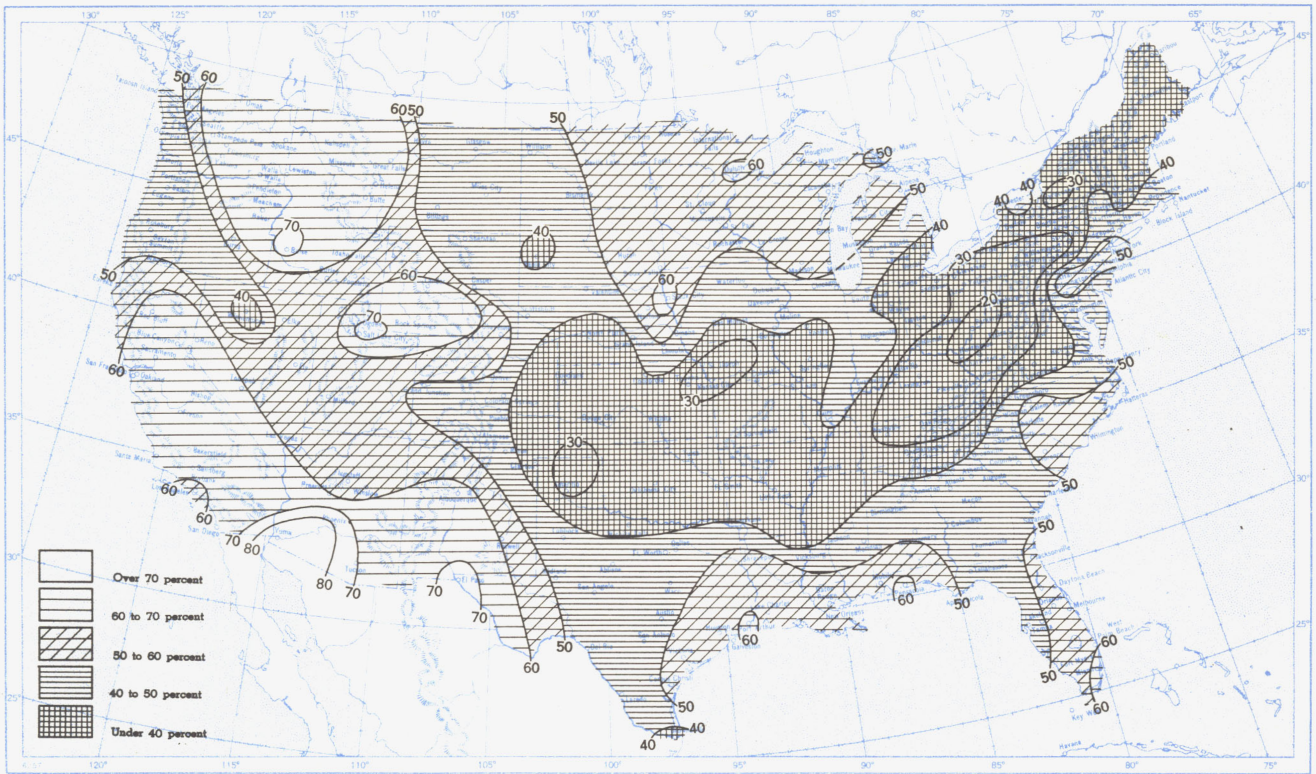


B. Percentage of Normal Sky Cover Between Sunrise and Sunset, March 1958.

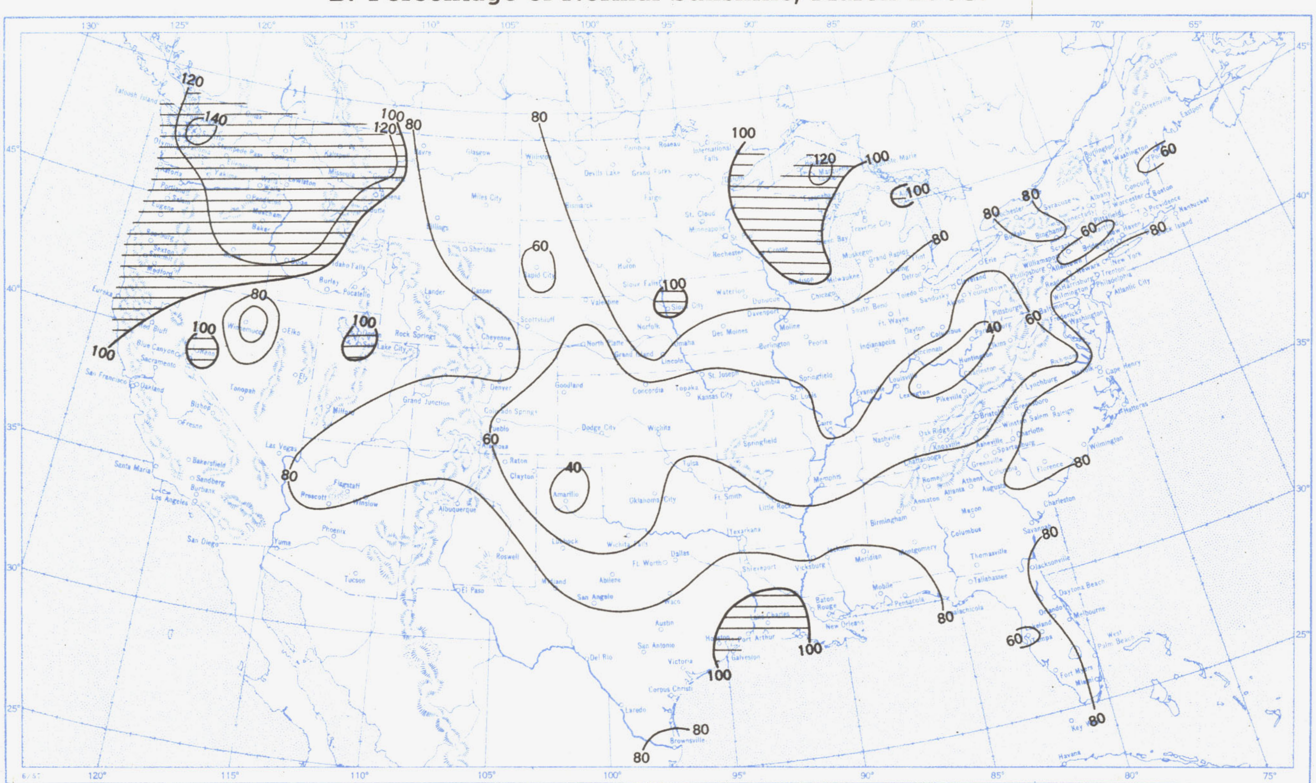


A. In addition to cloudiness, sky cover includes obscuration of the sky by fog, smoke, snow, etc. Chart based on visual observations made hourly at Weather Bureau stations and averaged over the month. B. Computations of normal amount of sky cover are made for stations having at least 10 years of record.

Chart VII. A. Percentage of Possible Sunshine, March 1958.



B. Percentage of Normal Sunshine, March 1958.



A. Computed from total number of hours of observed sunshine in relation to total number of possible hours of sunshine during month. B. Normals are computed for stations having at least 10 years of record.

Chart VIII. Average Daily Values of Solar Radiation, Direct + Diffuse, March 1958. Inset: Percentage of Mean Daily Solar Radiation, March 1958. (Mean based on period 1951-55.)

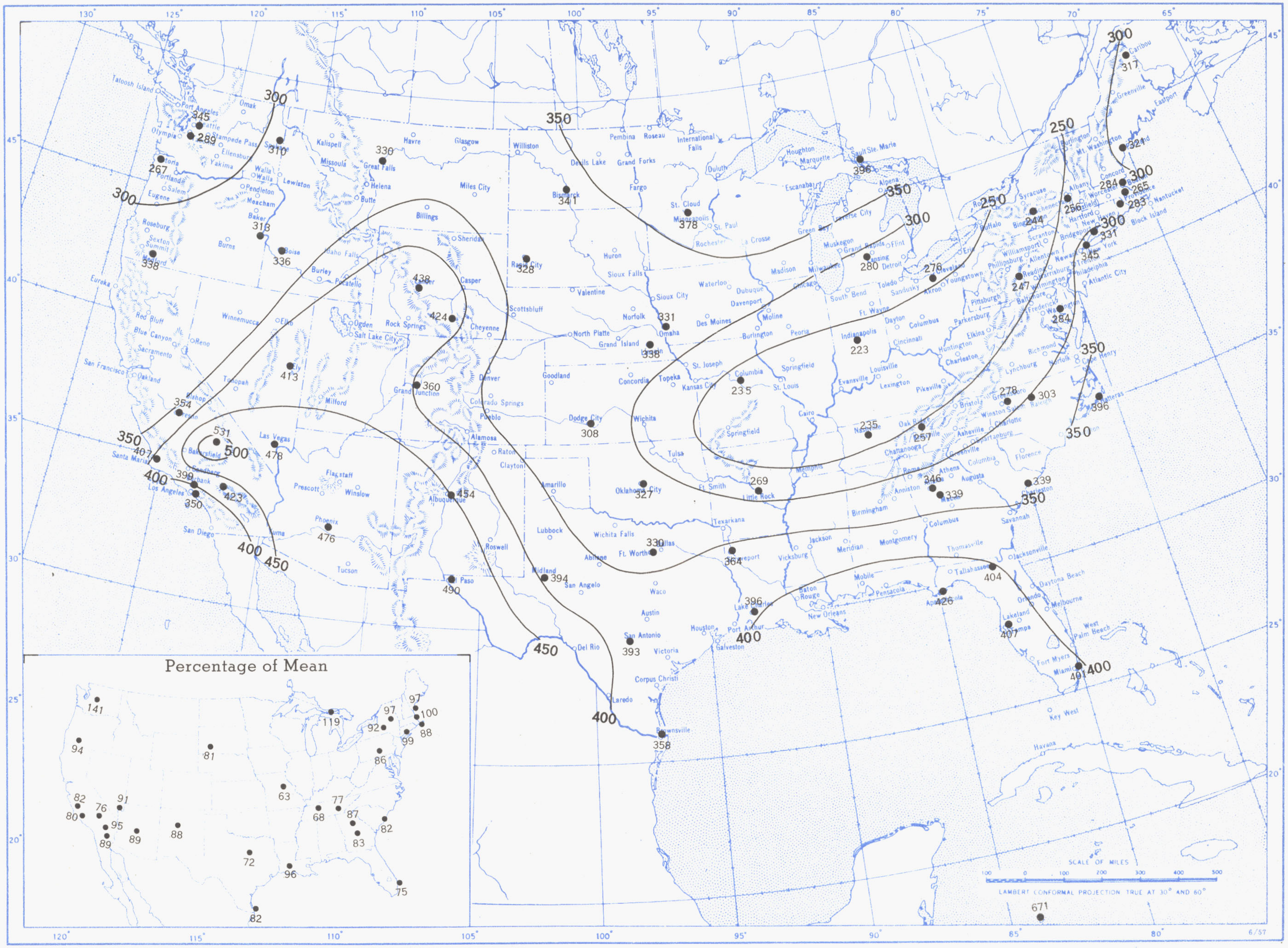
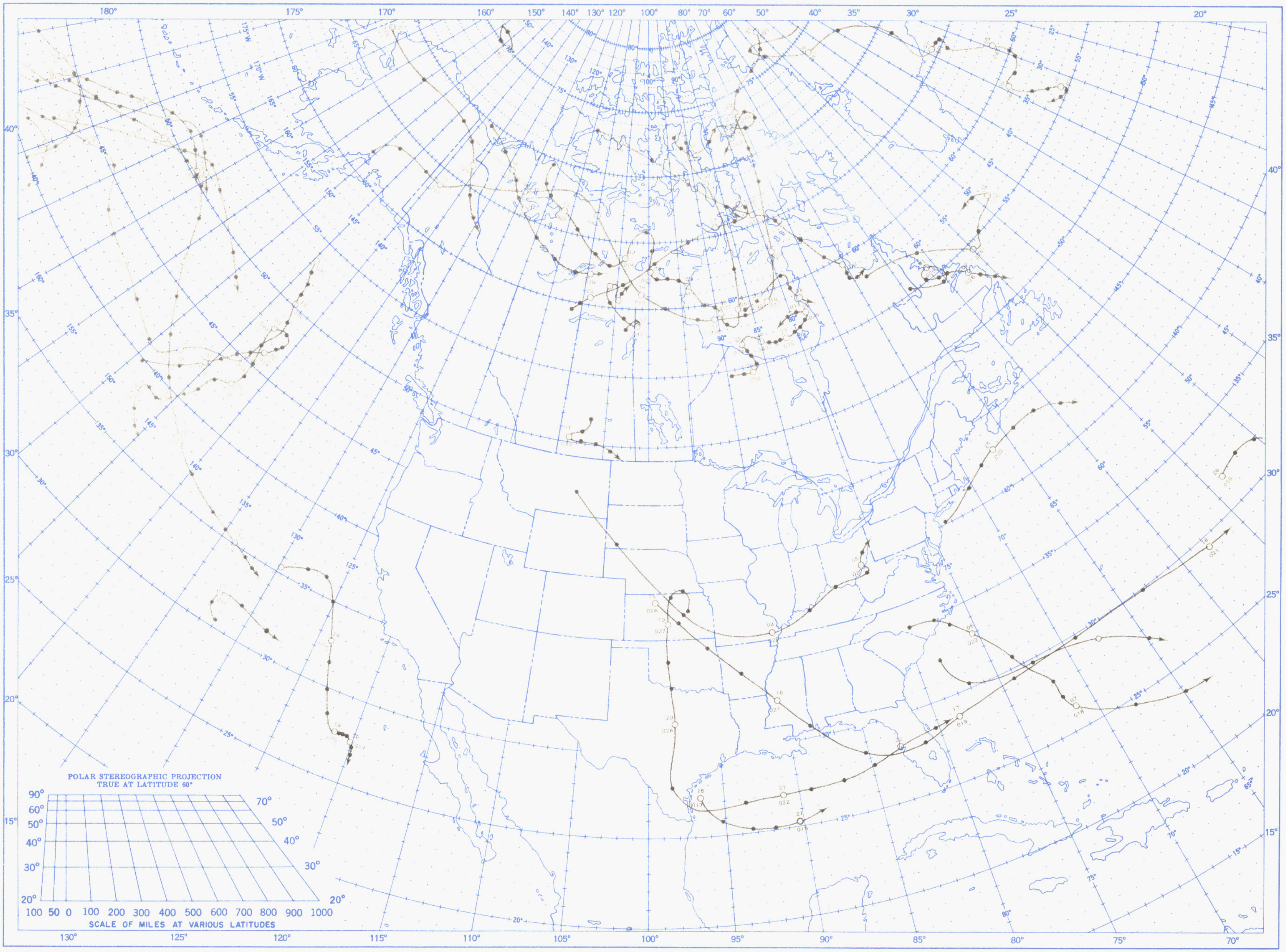


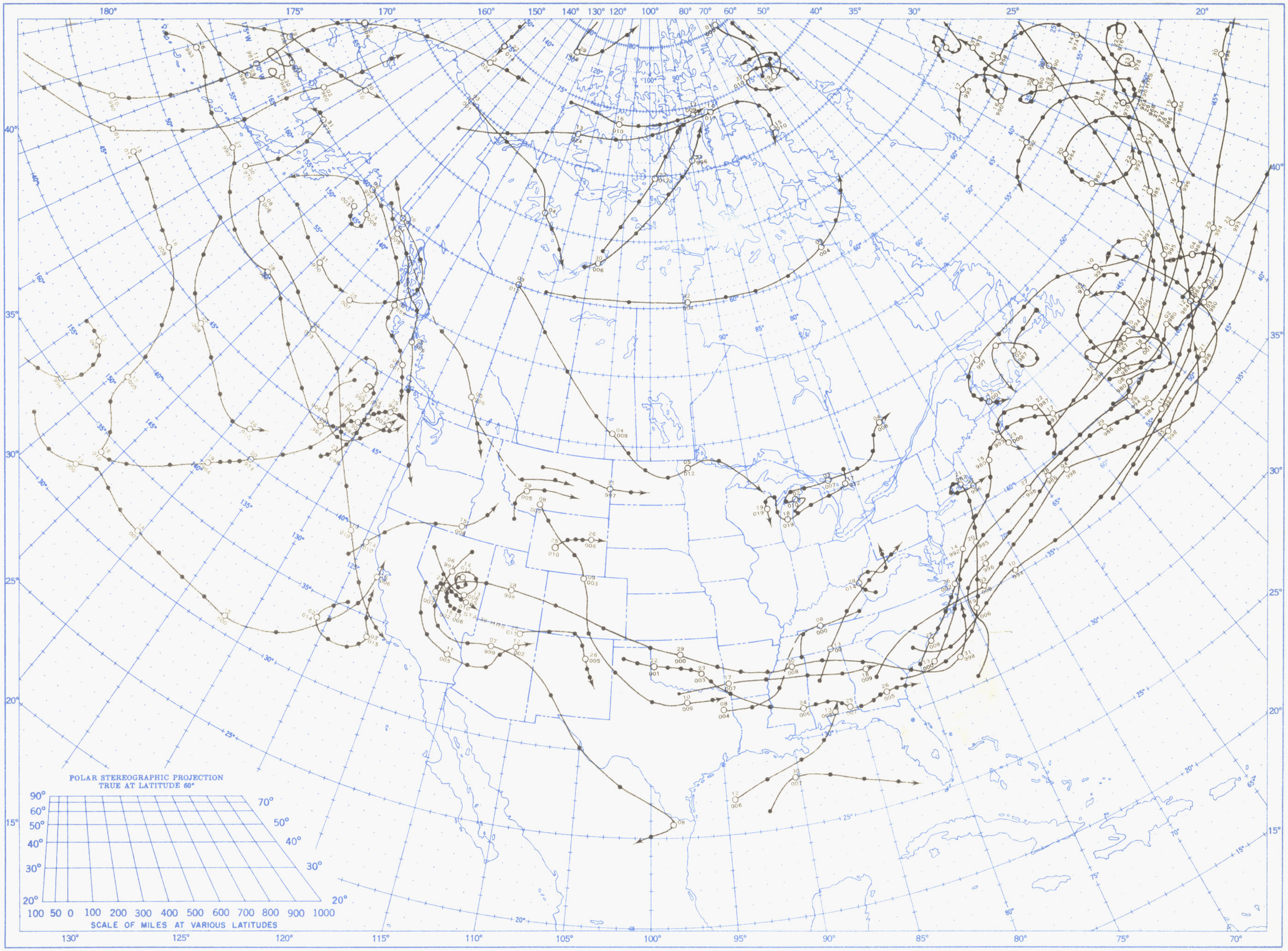
Chart shows mean daily solar radiation, direct + diffuse, received on a horizontal surface in langleys (1 langley = 1 gm. cal. cm. $^{-2}$). Basic data for isolines are shown on chart. Further estimates are obtained from supplementary data for which limits of accuracy are wider than for those data shown. The inset shows the percentage of the mean based on the period 1951-55.

Chart IX. Tracks of Centers of Anticyclones at Sea Level, March 1958.



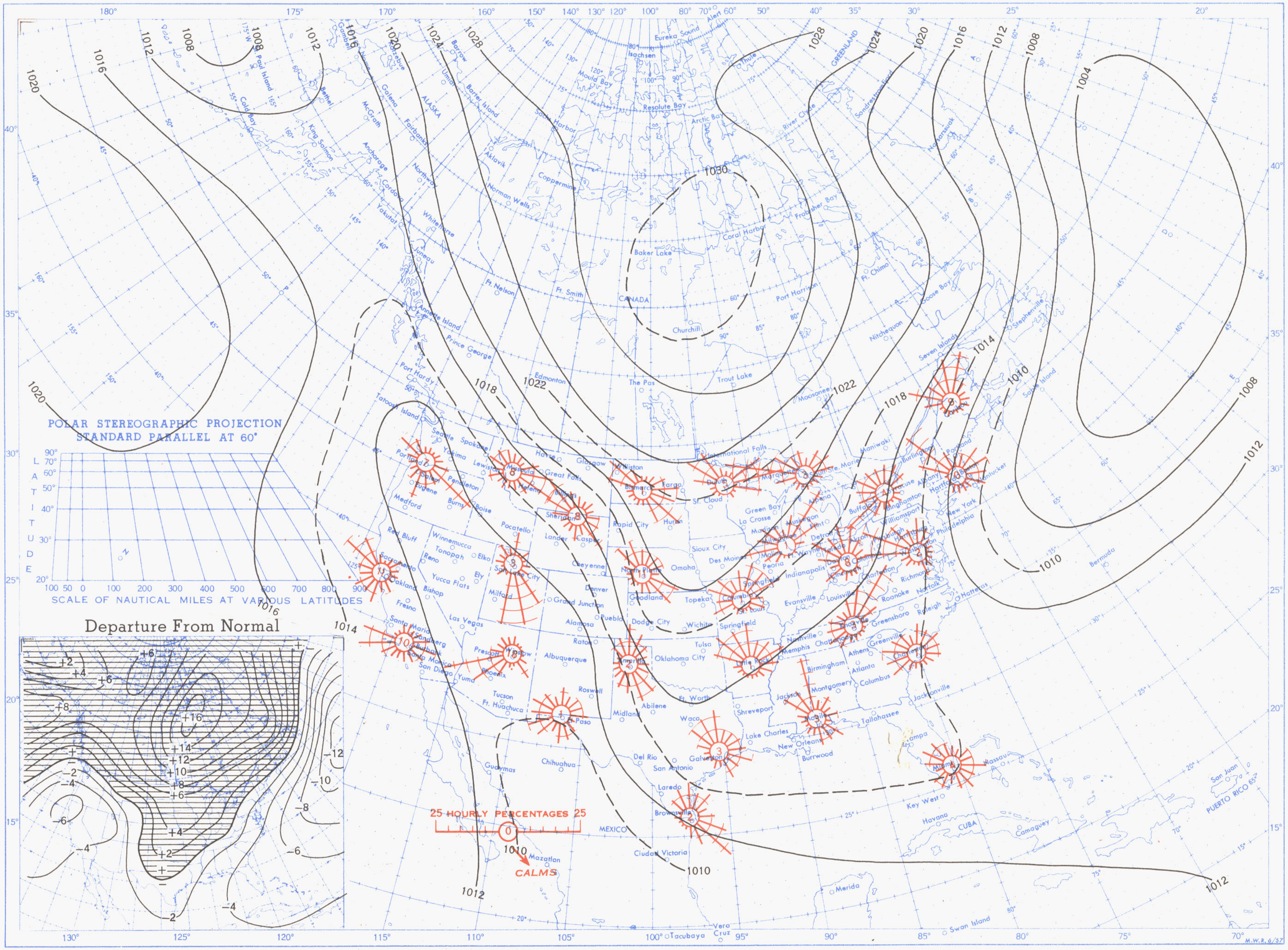
Circle indicates position of center at 7:00 a. m. E. S. T. Figure above circle indicates date, figure below, pressure to nearest millibar. Dots indicate intervening 6-hourly positions. Squares indicate position of stationary center for period shown. Dashed line in track indicates reformation at new position. Only those centers which could be identified for 24 hours or more are included.

Chart X. Tracks of Centers of Cyclones at Sea Level, March 1958.



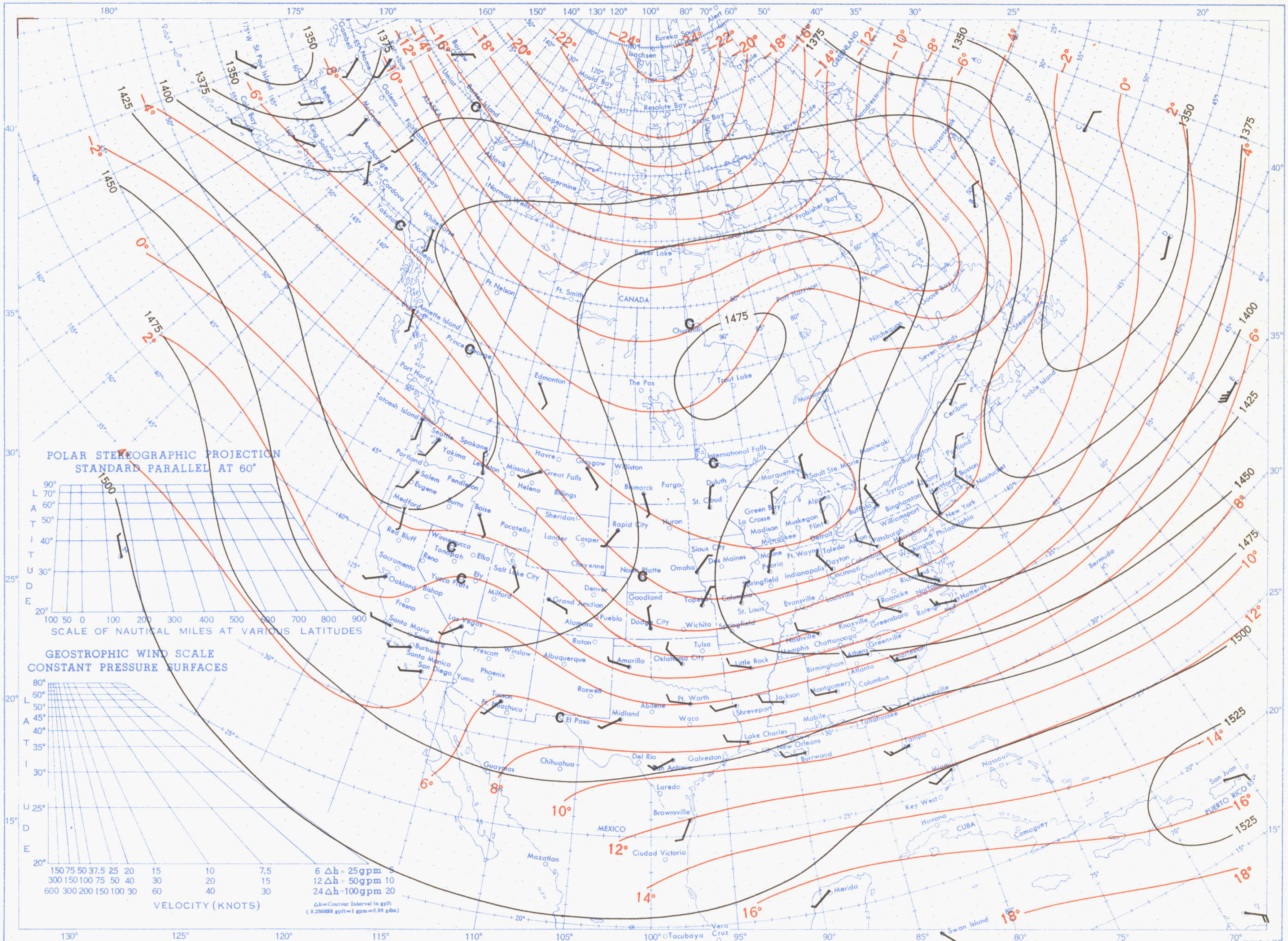
Circle indicates position of center at 7:00 a. m. E. S. T. See Chart IX for explanation of symbols.

Chart XI. Average Sea Level Pressure (mb.) and Surface Windroses, March 1958. Inset: Departure of Average Pressure (mb.) from Normal, March 1958.



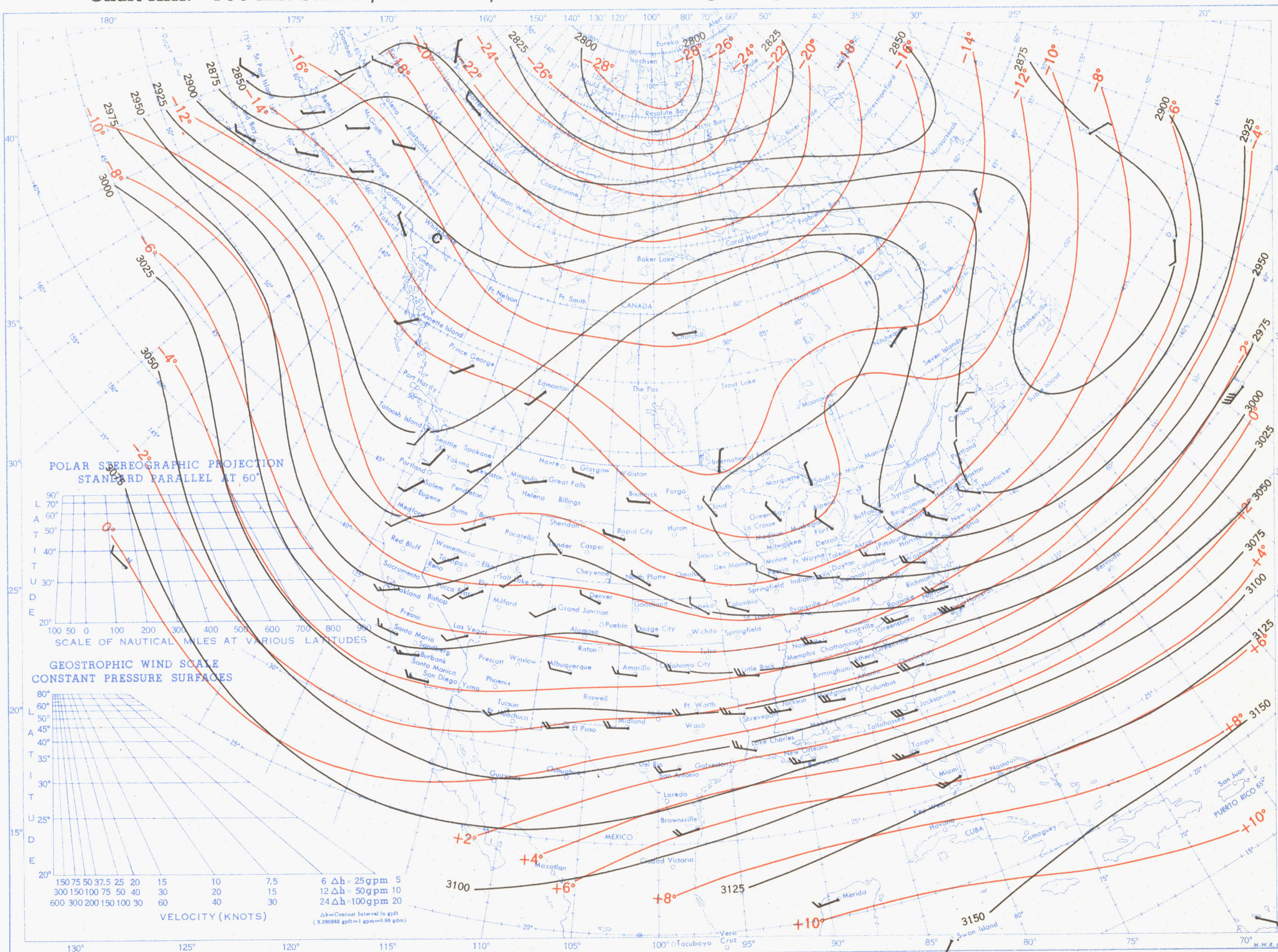
Average sea level pressures are obtained from the averages of the 7:00 a. m. and 7:00 p. m. E. S. T. readings. Windroses show percentage of time wind blew from 16 compass points or was calm during the month. Pressure normals are computed for stations having at least 10 years of record and for 10° intersections in a diamond grid based on readings from the Historical Weather Maps (1899-1939) for the 20 years of most complete data coverage prior to 1940.

Chart XII. 850-mb. Surface, 1200 GMT, March 1958. Average Height and Temperature, and Resultant Winds.



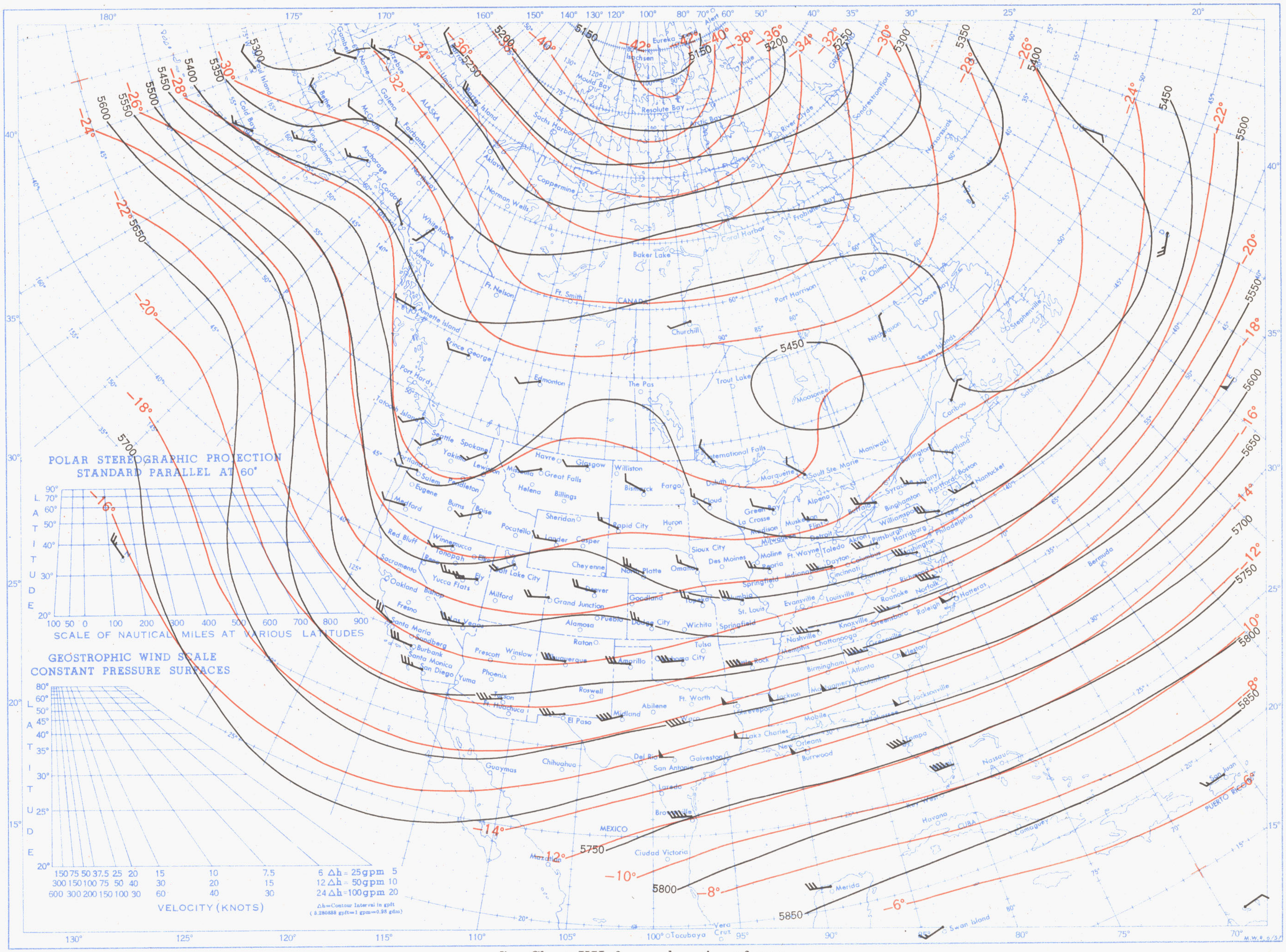
Height in geopotential meters (1 g.p.m. = 0.98 dynamic meters). Temperature in °C. Wind speed in knots; flag represents 50 knots, full feather 10 knots, and half feather 5 knots. All wind data are based on rawin observations.

Chart XIII. 700-mb. Surface, 1200 GMT, March 1958. Average Height and Temperature, and Resultant Winds.



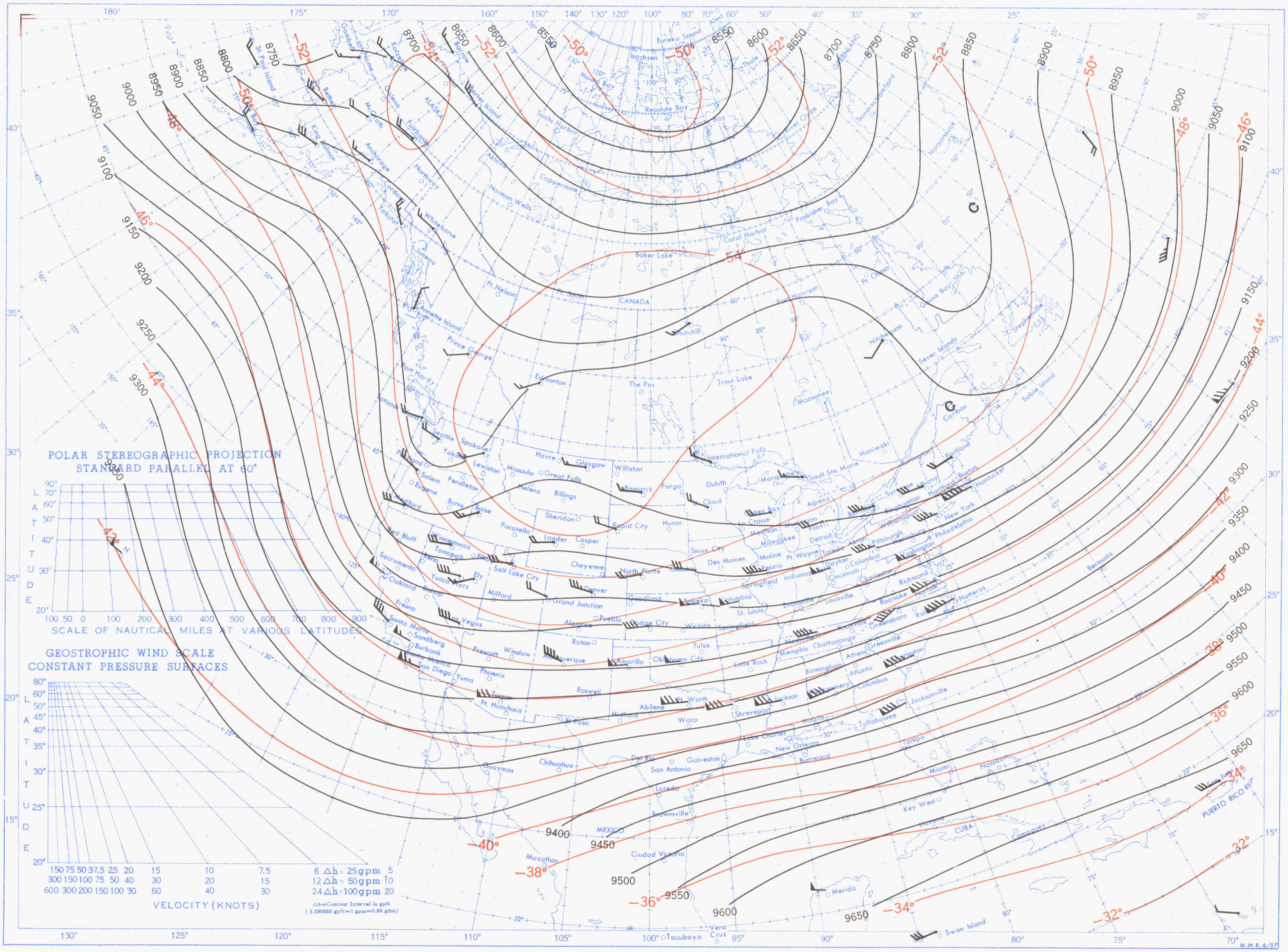
See Chart XII for explanation of map.

Chart XIV. 500-mb. Surface, 1200 GMT, March 1958. Average Height and Temperature, and Resultant Winds.



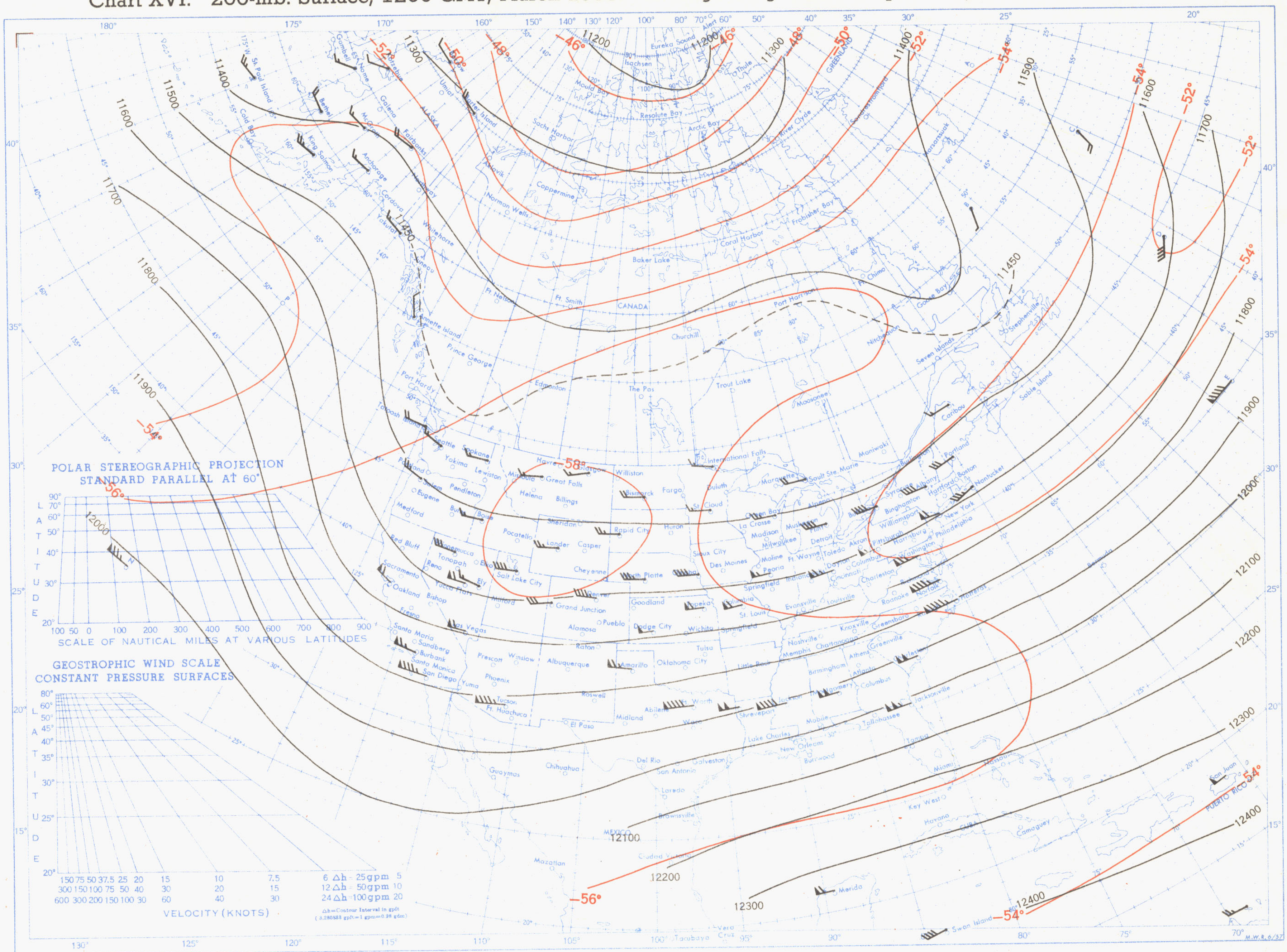
See Chart XII for explanation of map.

Chart XV. 300-mb. Surface, 1200 GMT, March 1958. Average Height and Temperature, and Resultant Winds.



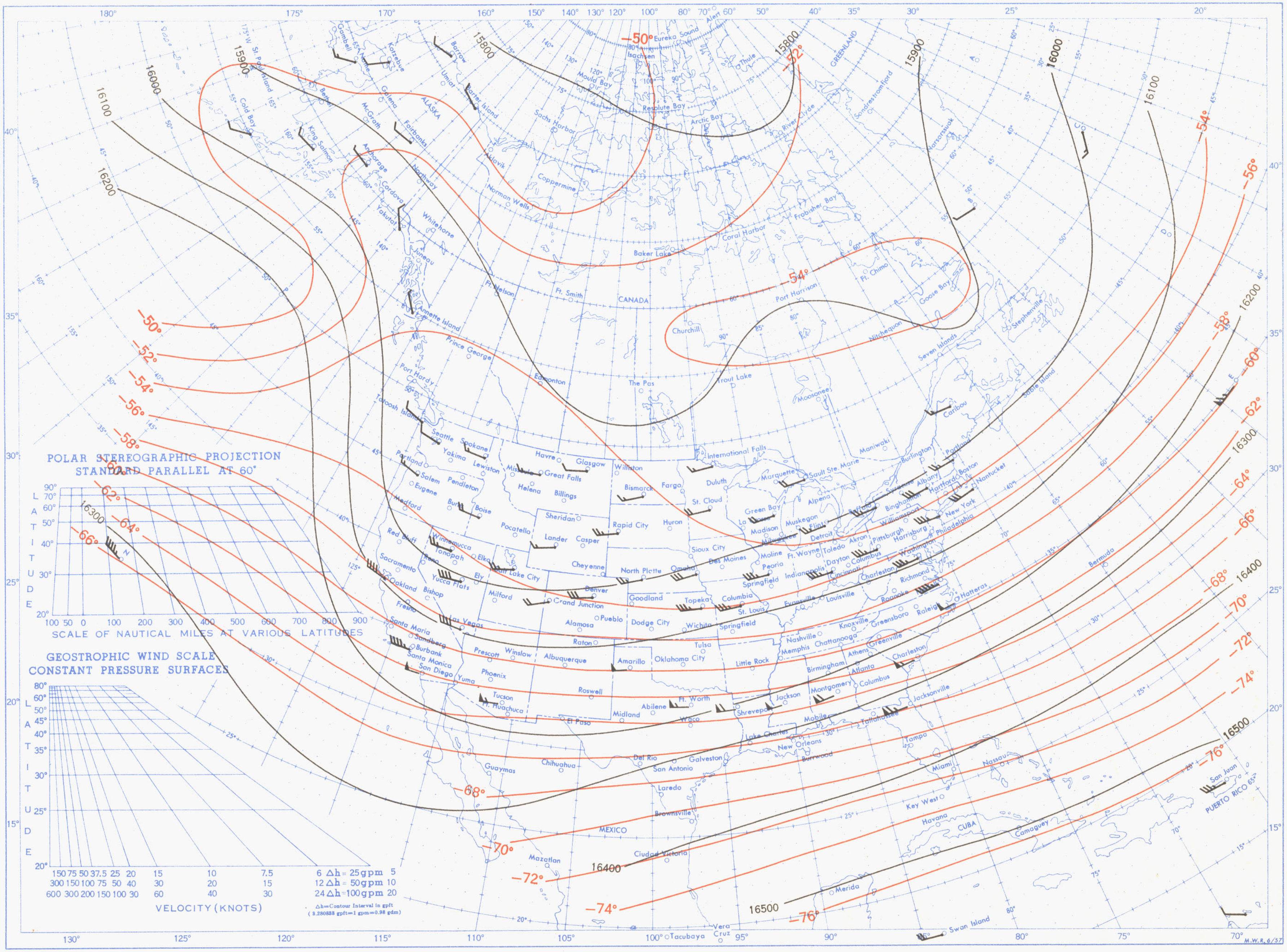
See Chart XII for explanation of map.

Chart XVI. 200-mb. Surface, 1200 GMT, March 1958. Average Height and Temperature, and Resultant Winds.



See Chart XII for explanation of map.

Chart XVII. 100-mb. Surface, 1200 GMT, March 1958. Average Height and Temperature, and Resultant Winds.



See Chart XII for explanation of map.